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Coal Age

Volume 45 Number 3

Cincinnati Ahoy! Calendar decorators should not forget to put down the American Mining Congress, which again stages its peerless Exposition of Coal-Mining Equipment and Convention of Practical Coal-Operating Men at the Music Hall, Cincinnati, Ohio, April 29-May 3. It's a must . . . **Don't forget,** either, that the April Pre-Convention Issue of Coal Age will contain numerous tips on what to see and do at Cincinnati, in addition to a selected list of articles on merchandising, safety and operation. And a valuable surprise for the operating man interested in charting his future course . . . **Speaking of the future,** mechanical mining and preparation continue as outstanding industry problems. So next month, Coal Age will publish accounts of mining a 40-in. seam with mobile loaders at the Eagle mine in southern West Virginia and operation with rubber-tired haulage at the Jefferson No. 20 shaft in Illinois . . . **Coal-preparation material** in April will include the details of the new Isabella reclaiming plant, where mine "slate" is washed to recover 30

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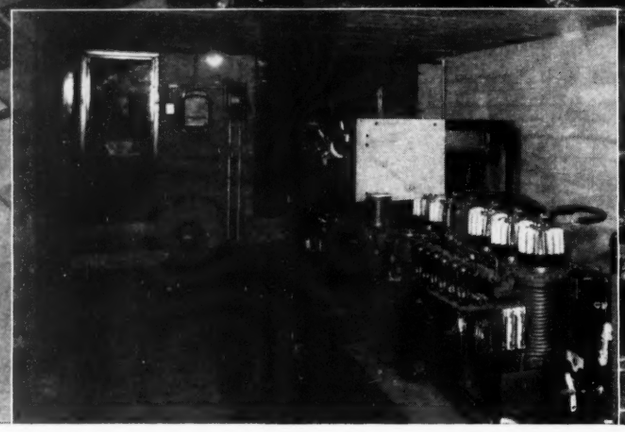
Born as an instrument of research,— but grew up to be a substation



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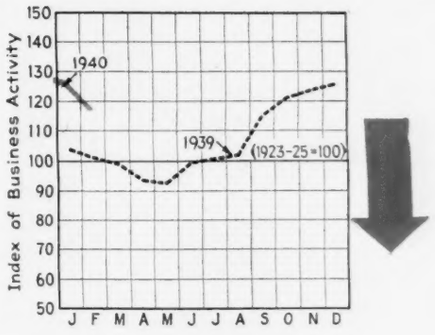
(CONTINUED FROM PAGE 5)

per cent of it as steam coal, and also the story of the Jefferson No. 20 preparation plant, where provision is made for breaking down the entire mine output to 5/16 in. and dedusting it at 10 mesh . . . **But all good things** are not being put off till April. Mechanical-mining fans will find in this issue T. E. Jenkins' account of how the new Eagle mine in northern Colorado was developed with shaker conveyors (p. 33); a story on chain conveyors on 90-ft. faces in thin coal in Oklahoma (p. 44); and a description of rubber-tired haulage and mobile loaders at the new Paradise mine in western Kentucky (p. 48) . . . **Preparation developments** in this issue include the use of a trough washer and air-pulsated jig for cleaning and an "air scrubber" and centrifuge for drying at the new Ayrdale plant in Indiana (p. 40), topped off by a description of washing in chloride and straight-wet equipment at Paradise (p. 51) . . . **But does the public** fully appreciate the care taken in mining and preparation? Apparently not, if a recent survey of domestic users is any indication. What this survey showed will be the subject of an April article . . . **The Coal Age front cover** this month, showing part of the drying equipment at Ayrdale, was released for editorial use by the Tidewater Associated Oil Co., whose advertisement occupied this spot last March.

HOW'S BUSINESS

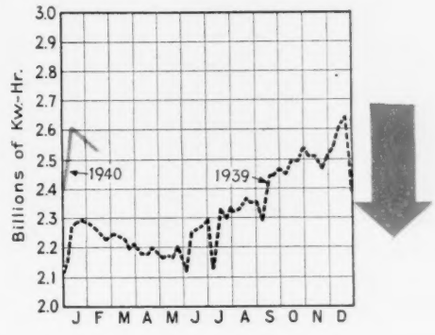
GENERAL BUSINESS ACTIVITIES

Business continues to show a downward trend, *Business Week's* Index showing its biggest drop—4.3 points—during the week ended Feb. 17. From a high of 125.7 in December it has declined 11.5 points—9 per cent—to 114.2. The recession, however, seems to have largely run its course, the decline showing a moderating tendency and indicating that the worst is behind us.



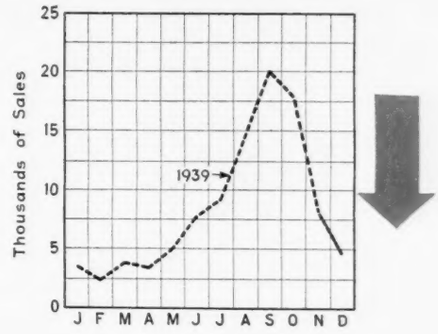
ELECTRICAL POWER OUTPUT

Output of energy by the electric light and power industry has shown a slight falling off during the last month to 2,572,117,000 kw.-hr. in the week ended Jan. 20; 2,565,958,000, Jan. 27; 2,541,358,000, Feb. 3, and 2,522,514,000, Feb. 10, according to the Edison Electric Institute. Though the decline is in line with the movement in other recent years, production remains 11.7 per cent higher thus far this year than for the corresponding period of last year.



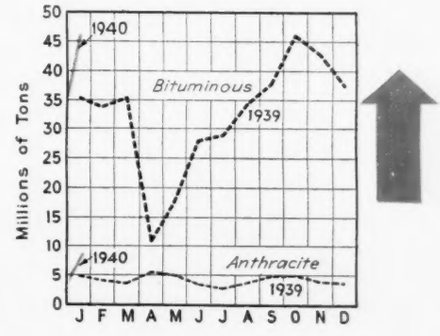
COAL-STOKER SALES

Mechanical-stoker sales in the United States in December last totaled 4,969 units (U. S. Bureau of the Census from 101 manufacturers), compared with 8,491 units (revised) in the preceding month and 4,971 in December, 1938. Sales of small units in December last were: Class 1 (under 61 lb. of coal per hour), 4,049 (bituminous, 3,370; anthracite, 679); Class 2 (61-100 lb. per hour), 382; Class 3 (101-300 lb. per hour), 331.



COAL PRODUCTION

Bituminous-coal production by United States mines in January last (preliminary figures) totaled 46,155,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with output of 37,283,000 tons in the preceding month and 35,750,000 tons in January, 1939. Anthracite tonnage in January last was 5,631,000 (preliminary), according to the U. S. Bureau of Mines, against 3,862,000 tons in the preceding month and 4,953,000 tons in January, 1939.



DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, Editor • MARCH 1940

Pertinent and Impertinent

• WHAT we need is correlation between mine-water acidity and mining methods and conditions. Mining practices may have much more to do with the character of the mine effluent than most mine managers imagine. Why, for example, do mines in southern Butler County, Pennsylvania, have an alkaline effluent? Is it the result of low pyrite, high alkalinity of the measures, absence of streams and river washes or methods of operation? The subject should be studied to offset by correctives the threat of ill-considered legislation.

• "LET'S AGREE to curtail production" has been a popular cry of late in some sections of the mining industry. But the unfeeling Department of Justice welcomed the new year by filing criminal information against a group of Carolinians accused of acting as a committee "in charge of a so-called curtailment program recently in effect in the print-cloth branch of the cotton-textile industry." This program, according to the government, called for a 25 per cent reduction in normal production for the third quarter of last year. And that, the Department of Justice alleges, was a violation of the Sherman anti-trust law.

• BEFORE TIME has been called, Secretary Ickes may discover that he hurled a boomerang when he complained that Dr. Finch was too much dominated by certain of his subordinates. There are people unkind enough to believe that the great front of Dr. Finch's offending has been a disinclination to be dominated by the Secretary and some of Harold's for-the-nonce political bed fellows.

• SECRETARY ICKES, through the Bituminous Coal Division, says Senator Robert A. Taft of Ohio, is attempting to fix coal prices "which will enable the miners and operators to make a reasonable living." But Secretary Hull, he adds, by cutting the impost on Venezuelan oil, puts coal at a further disadvantage in competing for Atlantic seaboard fuel business. Looks as if you have something there, Robert.

• SOME coal companies are so acutely conscious of the need for increasing trained personnel that they are sponsoring scholarships in mining schools. Too many, however, still appear to be operating on the principle that technical men are a nuisance, figuratively purchasable at a dime a dozen. Management of such mines hugs the delusion that ambitious young men can be lured with starting salaries of $100 to $125 per month and the promise of $175 to $200 in five or six years. Is it any wonder silly youngsters pass up such attractive offers to work for employers with more extravagant ideas of compensation and rate of advancement to employees who can deliver the goods?

Too Innocuous

LEGISLATIVE HISTORY shows that proposals superficially innocuous very often are more dangerous than measures which do not mask their real purpose. The Neely federal mine inspection bill (S. 2420), passed by the Senate without record vote on Jan. 18, would seem to belong to that category. Under the guise of serving the cause of safety, the bill authorizes the Secretary of the Interior to make annual inspections of all coal mines and report his findings thereon to Congress. In the case of accidents, special investigations also may be made—if the Secretary so elects.

A single annual inspection of the thousands of active mines in the country would contribute little to general accident prevention. Every State department familiar with the situation knows that much more frequent inspections are desirable. Since ousting of State agencies is not on the immediate program, the initial result of enactment of the bill would be the creation of another army of federal tax-eaters duplicating, if not imperiling, the

work of the States. And even the creation of this agency is left to the discretion of the Secretary: there is no mandate to intrust the inspection to the Bureau of Mines; indeed, that federal agency is not even mentioned in the bill.

The real purpose of this harmless fact-finding excursion, however, becomes clear in Section 6 of the proposal, which directs the Secretary to report annually to Congress what his inspections have revealed "together with . . . . such recommendations for legislative action as he may deem proper." This is an open invitation to press for authorization not only to inspect but to prescribe in detail just how the mines of the country shall be operated. Under such grant, what becomes of State inspection? What happens to management, which, after all, must foot the bill for the costs of accidents and, therefore, has a more potent spur for making mine operation safer than any federal code could possibly furnish?

Exposing the sham benefits of this bill and uniting to kill it in its present form should be a No. 1 job for the mining industry. But negation is not enough. There must also be a positive policy. Specifically, the industry should do at least three other things: It should back an amendment to the act establishing the Bureau of Mines which would eliminate any doubt as to the right of that agency to make inspections and, in the case of accident investigations, to publish its findings and recommendations. Where present State inspection forces are inadequate, the industry should campaign for increased appropriations to properly staff such forces. Last, but not least, the industry should take the lead in demanding that State mine inspectors be given civil-service status so that politics can have no place in accident-prevention activities.

Free Hands

CRITICS searching for cracks in the armor of organized labor would have found little to hearten them at the recent golden jubilee convention of the United Mine Workers. The nearest approach to division was on the political front, and there astute stage management carried the day for the Lewis administration. On questions affecting the relationships between the operators and the union, convention delegates cheerfully gave the international board a free hand—despite hundreds of local-union resolutions on various provisions of 1941 contracts.

Negotiations next year promise to open with a renewal of all the demands presented at the Appalachian wage conference in 1939. These already have been characterized by the international officers as "a bill of particulars for the aims of the union." Doubtless certain of these demands will be urged with renewed force. But no specific wage demands bind the negotiators' hands. Instead, the final instruction is that the committee "negotiate the best contract obtainable through the medium of a national, Appalachian or other proper joint wage-scale conference."

Friendless

NATIONAL administration demands for a renewal of blank-check powers in reciprocal trade agreements find no support in mining circles. Opposition engendered by the earlier Soviet and Canadian pacts has been intensified by the more recent Venezuelan treaty. Both the anthracite and bituminous divisions of the industry have protested vigorously. Organized labor as represented by the United Mine Workers also is on record against the present set-up. Metal and petroleum interests, too, are unhappy.

Condemnation by these groups is directed not against the basic principle of reciprocal agreements to promote a healthy foreign trade but against practices which further an unhealthy balance. Protests against the disastrous effects of such agreements on volume and employment in the mining industry, assert spokesmen for solid fuel, have been ignored by the State Department. Promises to remove patent inequities appear to have been promptly forgotten by administration officials.

There can be no valid objection in principle to the good neighbor policy so dear to the administration bigwigs. But an excellent principle which is so perverted in practice that it works harm to industry and labor in this country needs reexamination. If the principle is sound, then its practice should be safeguarded to prevent destructive perversion. In extending the statute under which the administration has been acting, Congress should do no less than require Senate ratification of all such agreements—more, if careful study warrants further limitations of departmental powers.

In Memoriam

TWENTY-TWO YEARS of devoted public service came to an untimely end last month with the death of Frederic G. Tryon. Coal economist and statistician, Fred Tryon left the indelible impress of his character on every task he undertook from his early days with the United States Geological Survey down through his final labors as chief of the research section of the Bituminous Coal Division of the Department of the Interior. A name to thousands who recognized the high caliber of his work, he endeared himself to the many who were privileged to enjoy his acquaintance or friendship.

No man worth his salt can spend years in one field of endeavor without acquiring strong convictions on many controversial questions. Fred Tryon was no exception to this generalization. But Fred Tryon never permitted his own personal convictions to blind him to the facts which daily passed before him in review. Neither would he distort a fact to support a thesis of his own or to confound an opponent. His intellectual integrity was impregnable. In these days when facts so frequently are twisted by their custodians to serve the ends of propaganda, no higher tribute could be paid to Fred Tryon than the simple acknowledgment that neither the accuracy nor the integrity of any statement which carried his signature was ever questioned.

CONVEYORS AND DUCKBILLS

Speed Eagle-Mine Development And Provide Efficient Thick-Seam Extraction

An average output of 900 tons per day of three shifts in less than ten months from the start of sinking and less than seven months from the start of underground development was the record made possible by shaker conveyors at the new Eagle mine in northern Colorado. Equipped with automatic duckbills, conveyor units operated by 4-man crews get 90 tons a shift out of rooms and 50 tons a shift out of narrow places in coal 8 to 10½ ft. thick, of which 1 to 2½ ft. is left to hold the roof.

By T. E. JENKINS
President, National Fuel Co.
Denver, Colo.

RAPID PROGRESS in development of the property is, perhaps, one of the most interesting features of the new Eagle shaft mine of the National Fuel Co., in northern Colorado. Sinking operations started March 2, 1939, and were finished three months later. Then, between June 1 and Dec. 9, a total of 18,564 ft. of narrow work was driven, 39 rooms were necked and made ready for operation, production was gotten under way in two rooms, and the output was brought up to an average of 900 and a maximum of 1,100 tons per day of three 7-hour working shifts, using three conveyor units in development and three additional units in rooms. This short development period was made possible by the use of shaker conveyors equipped with duckbills, and has established somewhat of a record for northern Colorado.

Eagle mine is located three miles east of Erie, Colo., at the junction of two important highways, one running south to Denver, a distance of only 18 miles, and the other a main east-west route which passes through Erie and goes on to Boulder, Golden, Longmont and other cities to the west.

The coal seam recovered at the new operation is the lowest workable measure of the lower Laramie-Cretaceous formation in the Denver Basin. While the coal has been mined for many years in this district, the Eagle mine is the first to start operations at this particular location. Extensive and painstaking drilling operations have been carried on in this locality, with the result that the main shaft at Eagle is sunk almost in the precise center of the entire coal area, which consists of two full sections, or 1,280 acres, of coal land. The coal itself compares favorably in quality with other subbituminous coals being mined in this district.

The seam pitches about 1½ deg. to the southeast and ranges from 8 to 10½ ft. in thickness. The coal contains no visible impurities and lies under about 360 ft. of cover. The top is soft sandstone and shale, which falls easily, making it necessary to leave 2½ ft. of top coal in headings and 12 to 18 in. in rooms for protection. The bottom is soft sandstone.

Full-retreat mining is the operating practice at Eagle, with entries driven to the boundaries and room entries developed from them as shown in Fig. 1. Rooms are turned from one side only of the room entries: i. e., from the aircourse, and when each room panel is fully developed, rooms are worked on the retreat, the practice being to drive a room to its full depth and then immediately take out the pillar down to a small stump for entry protection. Upon completion of pillar removal, driving of the next room is started. Partial recovery of the room stumps and entry chain pillars on the retreat accompanies room work.

A distinctive feature of this operation is that the barrier pillars along the main entries are 300 ft. wide. It is expected that these wide pillars will furnish a greater measure of protection than heretofore has been experienced in this field and at the same time will provide an ample and concentrated tonnage of coal after the mine has been completely developed to the boundaries and the barrier pillars are being recovered restreating.

Panel entries are driven on 350-ft. centers, and each panel consists of twenty rooms turned, as indicated above, one way from the aircourse on an angle of 90 deg. This throws the rooms up the pitch. Headings making up the main and room entries are driven 10 ft. wide on 40-ft. centers. Rooms also are driven on 40-ft. centers after first being necked 12 ft. wide for three full cuts, or a depth of about 18 ft. After necking, rooms are widened to 20 to 25 ft., leaving a 15- to 20-ft. room pillar. They then are driven 300 ft. deep, measured from the haulage heading, which results in leaving a thin barrier pillar along the haulage side of the next room entry.

Developing for rooms is one of the more interesting operations at Eagle. As the two panel headings (haulageway and aircourse) are advanced toward the boundary, room necks (Fig. 2) are turned off the aircourse

and one cut is loaded out of each. Except at loading points, however, the crosscuts opposite the room necks are not cut through. Instead, three cuts are loaded out of each such crosscut and the fourth is made but is not shot or loaded. This system has several advantages. For one, it reduces the number of stoppings to be built. And, more important, when room work is begun, a place is ready for setting up the conveyor drive and duckbill.

In working a room, the drive is placed in the crosscut so that the conveyor discharges into cars in the haulage entry at the point where the crosscut is turned off. The last cut in the crosscut is shoveled into the conveyor by hand. Then, the trough line is extended across the aircourse into the room neck, the duckbill loading head is attached as soon as possible, and room loading proceeds.

Duckbill heads are used for practically all entry, room-neck and room loading, as the entry-advancement system permits duckbill working in all openings. The crosscuts driven through to the room necks permit installation of sufficient troughing for ideal duckbill operation, practically no hand loading being required.

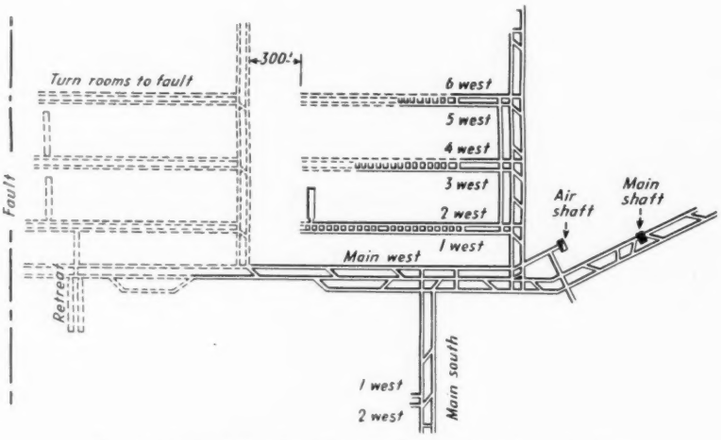


Fig. 1—Map of the Eagle mine, showing development plan.

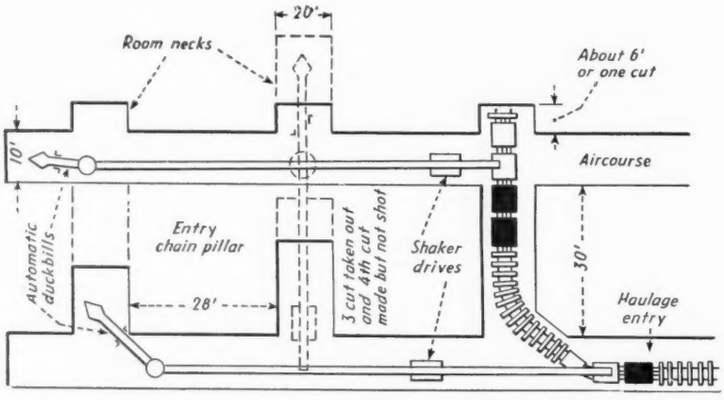


Fig. 2—Method of driving room entries and necking working places.

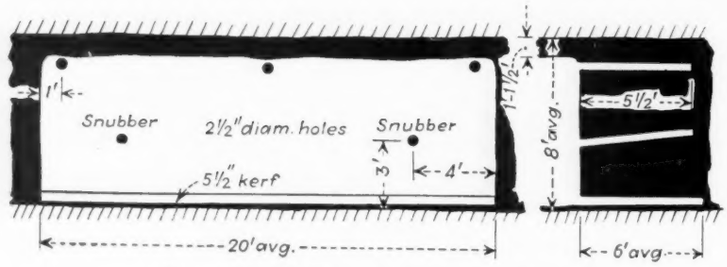


Fig. 3—Usual drilling pattern for a room face.

Each working place is equipped with a Sullivan CE-7 shortwall cutter with 6½-ft. bar, a "Little Giant" handheld electric coal drill, a 5-hp. Buffalo Forge Co. room blower and tubing for auxiliary ventilation, and a Goodman shaker-conveyor unit made up a Type G-20 drive, troughing and automatic duckbill. M-S-A electric cap lamps are used.

Timbering, cutting, drilling, shooting and loading are continuous in a place and a complete cycle requires an average of 2 hours and 20 minutes in rooms and approximately 1 hour and 45 minutes in narrow work. In addition, there is extra timbering and such deadwork as advancing pan lines, bringing up supplies, etc. Including changing trips, an average of three cuts per 7-hour shift has been maintained in development work. In room work, the average has been 2½ cuts. Thus, the average yield per shift in room work is 90 tons, compared with 50 tons in narrow places.

34 Men Per Shift

A complete shift at the present time consists of six four-man conveyor crews and ten general men, making a total of 34. Conveyor crews are the same in both room and narrow work and are made up of a cutting-machine operator, a helper (face and timberman), a duckbill operator and a car trimmer. The general crew comprises a foreman, two motormen, three trackmen, two timbermen and two bottom men (one cager and one coupler). Roy Williams is general mine superintendent and E. S. Bryson is superintendent of the Eagle mine.

Entries usually are advanced well over 300 ft. before the equipment is moved up, and the maximum distance has been about 400 ft. A full crew will dismantle, move and install a unit at the next place in one shift as a rule.

In working rooms, the conveyor drive, as stated, is set up in the crosscut on the entry and as the room face advances one pan is added to the trough line after each two cuts. The trough line is suspended from props set along the conveyor by means of ½-in. chains (Fig. 4). Each pan is equipped with chain "grab" hooks which are welded on.

A room face is broken down with three top and two lower snubber holes placed about as in Fig. 3. Holes are loaded with 4-ft. Cardox 2-100 shells. The snubbing holes are fired first, after which the coal thus broken down is loaded out completely. Next, the

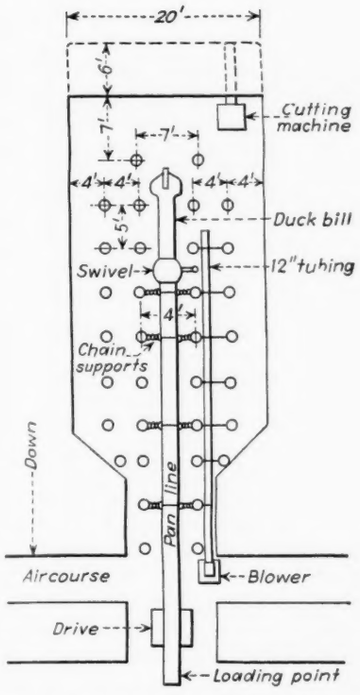


Fig. 4—Timbering and equipment layout in a 20-ft. room.

right-hand and center top holes are fired and loaded out, and finally the left-hand top hole is fired. The cutting machine then is sumped into the right-hand corner and starts cutting across the face while the remaining coal is being loaded. Usually, loading is completed before cutting is finished and the duckbill operator then begins drilling the next set of holes.

Rooms are timbered throughout with round props about 8 in. in diameter and 8 to 9 ft. in length. Props are set on 4-ft. centers across the room and on 5-ft. centers lengthwise of the place. At the end of the conveyor, two posts about 7 ft. from the face are set one each side of the room center line and about 3½ ft. away. No crossbars are used.

After a room has been driven to its full depth, the pillar between the room and the worked-out area is extracted. This is done by taking out successive slabbing cuts 30 ft. long beginning at the face and working through the pillar. Use of a swivel makes it possible to load such cuts almost completely out with the duckbill. The conveyor is shortened as the pillar is removed, and as the pans are taken off they are stored in a place convenient to the next room to be worked. When extraction has been completed, leaving a small stump to protect the entry, the conveyor drive is moved to the next outby crosscut and set up for advancing the next room.

Eagle-mine haulage equipment consists at present of one 4- and two 6-ton General Electric locomotives—all of the trolley type. No cable-reel equipment is used. The 4-ton unit acts as a swing locomotive and has no regular motorman. Service to a conveyor unit is accomplished by pushing a trip past the loading point and then, when it is loaded, pulling it out to a service parting to permit switching another empty trip back to the loading point. This operation rarely consumes more than 10 minutes. When a cut has been loaded out, the complete trip is hauled to the bottom. Later, when haulage distances are greater and production is larger, a 10-ton main-haulage locomotive will be installed to handle trips between an inside parting and the bottom.

Coal is hauled in all-steel C. S. Card end-dump cars equipped with roller bearings and link-and-pin couplings. Car capacity is approximately 2.5 tons. Track gage is 36 in. Main entries are laid with 50-lb. rail, with 30-lb. on cross entries. The 5 x 8-in. ties of untreated red spruce are spaced on 18-in. centers. Slants are used for

Automatic duckbill digging coal out of a standing face.

Shaker drive set up a crosscut for advancing a room.

Shaker discharging into mine car in development work.

partings. A minimum of 3 ft. is left between the track and the right-hand rib for clearance.

The mine is ventilated by a 5½-ft. Jeffrey Aerodyne fan driven by a 10-hp. motor. At present, the mine requirement is only 30,000 c.f.m. and the fan, therefore, is running with only half its full complement of blades. Later, as mine requirements increase, all the blades will be used, along with a larger motor. The air is distributed by means of overcasts, using one intake and two returns. Auxiliary blowers are used in each room.

Cars are hoisted on self-dumping cages by a 250-hp. electric hoist. When tonnage increases, a larger hoist motor will be installed. Depth of the main shaft is 370 ft., and its size is 10 x 18 ft. Two compartments permit hoisting in balance.

Of the most modern type, the tipple, designed by the Allen & Garcia Co., has an ultimate capacity of 3,000 tons per day and is equipped to handle all sizes from ¾-in. slack to the largest lump. The small sizes are oil-treated to render them dustless. No washery is required, as the coal is virtually clean as it comes from the mine.

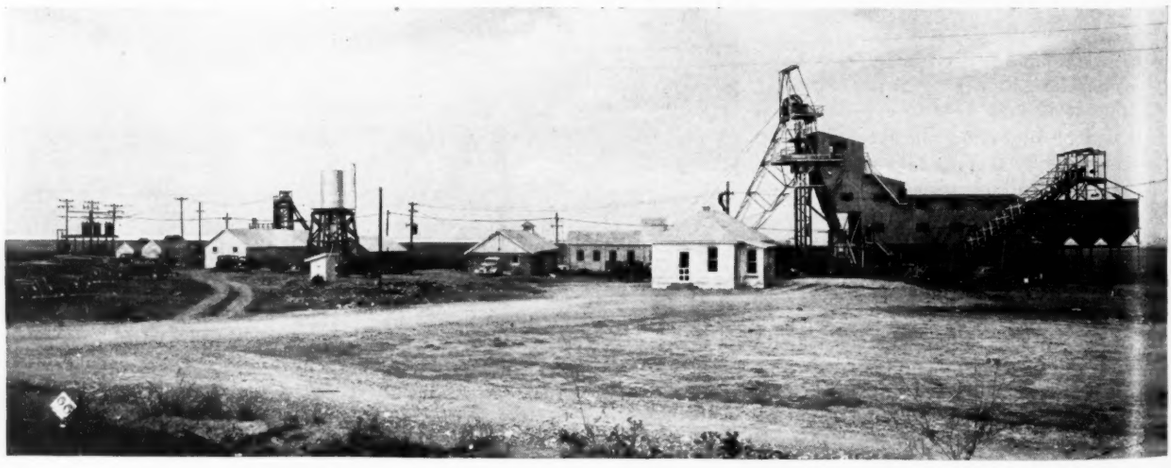
Four railroad tracks serve the tipple, and in addition there is a storage bin for truck sales. This bin handles 2½-in. slack, 1½-in. slack, ¾ x 1½-in. modified pea and 1½ x 2½-in. pea. In addition, trucks may obtain larger sizes from the loading booms at the screen chutes. Railroad cars are delivered to the tipple over a spur from the main line of the Union Pacific R.R.

The largest possible percentage of plus 6-in. coal is produced, as lump is the premium size in the market territory served by the mine. By size fractions, the output runs approximately as follows: plus 6 in., 30 per cent; 2½ x 6 in., 60 per cent; and minus 2½ in., 10 per cent. The coal fractures easily and will not stand too much rough handling. As it cannot, therefore, be shot out loose from the face, the duckbills must dig it out, and extreme care is taken to avoid undue breakage of solid lumps in loading.

All power to operate the Eagle mine is purchased from the Valmont steam plant of the Public Service Co. of Colorado. It is received at the mine substation at 13,000 volts and is stepped down through a bank of three 150-kva. 60-cycle transformers to 440, which is the voltage used on all mine equipment except the locomotives. These operate on 250 volts d.c. Alternating current is taken into the mine and carried to all sections by three-wire rubber-covered cable. Locomotive power is furnished by two 75-kw. motor-generator sets installed in the engine room on the surface. As the underground workings become more extensive, these sets will be moved below and thereafter advanced as required. The trolley wire is 4/0 with no feeders. Both rails of all track are bonded.

Besides the tipple and engine room, the surface plant at Eagle includes a scale house and office, a well-equipped mechanical and electrical shop, a blacksmith shop, a change house for the miners equipped with hot and cold showers, lockers, etc., sufficient for 150 men at a time, a cap-lamp charging building, Cardox charging plant, miscellaneous facilities, such as storage for lubricants (Mobiloil), and several houses for the use of mine officials. The miners live close by in their old homes at the Puritan mine of the National Fuel Co., now being abandoned. The company store also is on the Puritan property.

Eagle-mine surface plant, with the tipple and storage bins for truck loading at the right.



HAZLETON SHAFT DEEPENED

By Sinking and Raising to Provide Output of 4,250 Tons of Anthracite Per Day

A twin shaft, two compartments of which had been devoted to coal hoisting and two to water hoisting, had to be sunk to a lower level. The shaft worked almost every day, and sinking would, therefore, be slow; hence, as the mine had been developed by slopes almost to the bottom of the basin, it was decided at the level to be developed to drive a tunnel under the shaft and then raise the shaft from that level, sinking only as far as convenient.

By R. DAWSON HALL
Engineering Editor, Coal Age

INCIDENTAL to a much larger general program that has quadrupled the output at the Hazleton shaft, which lies near the Pennsylvania city of that name, the Lehigh Valley Coal Co. decided to lower the bottom of the shaft 117½ ft. so that it would reach what is now the Third Level and provide for that level's development. As the old sump at the Second Level was about 55 ft. deep and the projected sump at the Third Level only 10 ft., the distance between the Second Level and the Third was 162½ ft.

The management decided to lower the shaft mainly by raising from the Third Level, for only when the colliery otherwise was idle could it be extended by sinking without hazard to excavators and interference with their work. Thus sinking would have confined the excavatory work to a single shift. If, however, the shaft was extended by driving a raise from the roof of a tunnel under the shaft, which tunnel had already been driven from a slope in the same mine, it would be possible to triple-shift that part of the work. Furthermore, if the shaft was to be sunk, the rock would have to be loaded in driblets into buckets and cautiously hoisted to the Second Level, where it would have to be dumped and loaded into mine cars, but, by raising the shaft from the Third Level, a mechanical loader could be stationed alongside the shaft to load the mine cars without any intermediate handling.

After a narrow rockhole had been driven up to the bottom of the original sinking, so as to remove from the bottom of the shaft loose material and water so mixed with rubbish as to be unpumpable, it would then be safe to complete the cross-section by driving a large place upward as if it were a vertical chamber or stope in the rock, holding always enough *débris* in the place for drillers to stand on and providing a timbered way up which men could reach their working places and another timbered way in which timber and material might be raised or lowered.

The sinking of the shaft to a lower level and the extensive underground changes with which it was accompanied were motivated by a desire to operate the Hazleton breaker on coal derived from the thick beds in the Hazleton shaft operation. For years past, 70 per cent of the 4,000 tons of coal cleaned in the breaker has been derived from stripping operations and outside mines. This adversely affected both the standard of its product and its production cost. Large-size coal of superior quality minable at lower cost was available in the mine which, while it had been worked over, like most thick beds mined at an early date, had not been much more than sampled.

A thorough investigation and study of the colliery, conducted early in 1938, established the fact that reserves of highest quality subsurface anthracite, predominantly of the Hazleton Basin Mammoth bed, here about 30 ft. thick, were available on the property in quantities sufficient to provide the preparation plant with a sustained output of 4,250 tons per day for over twenty years and that the economic performance of the colliery definitely could be improved by substituting subsurface production from its own mine for the outside contributions to its breaker input.

But to raise the subsurface output from 1,200 tons daily to 4,250 tons, as stipulated in the project, required time. However, a schedule of procedure showed that it could be done in about five months. This work included not only (1) the sinking of the shaft but (2) the reconditioning of 325 linear feet of the two western (water-lift) compartments from the surface to the Second Level, (3) the construction on the Third Level of a shaft bottom with transportation approaches and of about 1,300 linear feet of 8x17-ft. double-track tunnels, also (4) in the Second and Third Levels the driving of rock gangways and rockholes for entering the already

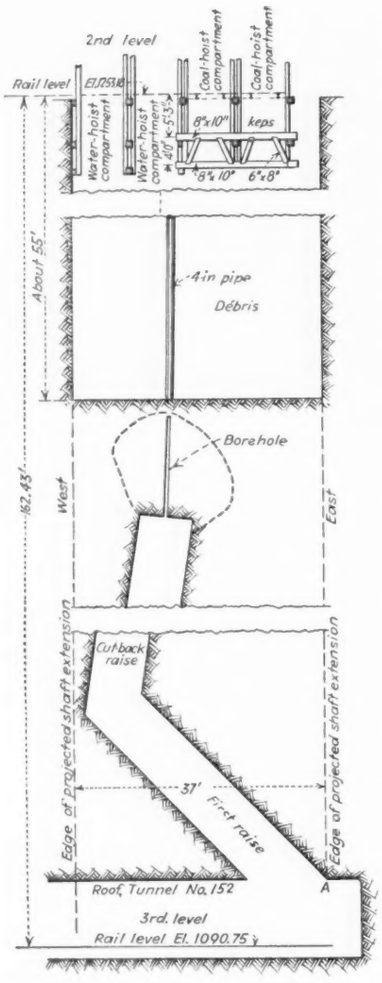


Fig. 1—Method of raising rockhole to bottom of original sinking in Hazleton shaft. Note elbow in raising, so that rock in falling had its violence broken.

first-mined Mammoth Bed, and the construction of coal gangways, chutes and airways for reaching the thinner coal beds. Other activities were the reopening in the same levels of old gangways and transportation roads leading to an abandoned mine area, the construction of several secondary tunnels to reach a certain mining area, improvements in transportation and the dewatering of local basins by boreholes.

Mining and development were to be double-shifted; the entire coal output, with the rock and waste incidental thereto from the First, Second and Third Levels, was to be hoisted through the main shaft instead of through slopes, as much of it formerly had been handled. In view of the expected large increase in the subsurface production, it was found necessary also to double-shift the shaft hoist while the breaker operated on a single shift, hence provision had to be made on the surface to store about 2,000 tons of coal and to handle a proportional quantity of waste material derived from the second-shift operation.

Day-shift coal would reach the breaker gunboat pit practically as before, but the second-shift hoisting, to provide for overnight storage, would discharge its coal into a chute located at a higher elevation and thence would pass into railroad cars which later would be passed over the gunboat pit. A mechanically operated disposal plant was to be provided to work in conjunction with the coal-dumping arrangement at the head of the shaft.

The general project was approved early in May, 1938, and actual work commenced in the second half of May, with shaft construction work on July 1. Thereafter, work progressed on a three-shift basis. By the first half of September the shaft had been extended to the Third Level and most of the proposed inside development work and outside improvements were completed. The first car of coal from the Third Level was hoisted through the extended shaft on Sept. 26 of that year. The project demonstrated its validity by the performances shown in the accompanying table.

Average Subsurface Output at Hazleton Shaft Per Start

Period	Tons
October, 1938	3,650
December, 1938	4,200
February, 1939	4,400
March, 1939	4,500
April, 1939	4,800

Coal from outside sources, stripping and mine, was gradually eliminated as the subsurface production increased to carry the burden.

Hazleton Colliery Twin Shaft has a rail level at the collar of 1,579.65 ft. above tide and the top of the rail at the Second Level is 1,253.18 ft., so the lift was 326.47 ft. However, the shaft had been extended another 55 ft for sump purposes and to accommodate the filling of the tanks of a water hoist. The water hoist had long been discontinued, and spillings from the cars and even cars themselves which dropped into the pit had through the years filled 30 ft. of this excess depth. Rail elevation at the Third Level is 1,090.75 ft.

Care not to mine too close to the shaft and the inherent hardness of the rock have kept the shaft walls in good condition without support other than that supplied by buntons, wall plates, posts and laggings, though the upper portion down to hard rock is concreted. The cross-section is unusually large—14 x 37 ft. For many years it served not only for two coal-hoist but also for two water-hoist compartments, leaving a half compartment available for other services. This is now used for electric feeders and signals.

Water hoisting, of which the anthracite region once was justly proud, is now definitely uneconomical, even in emergencies, so rapidly has the pumping art progressed; for this reason, the water-hoist compartments at this colliery are available for hoisting coal and are thus being used.

Early in 1938 a cross-section taken across the basin on a north and south line at the shaft, as illustrated in Fig. 4, would have intersected three slopes in various parts of the mine, all of which at that time had been extended down to the elevation planned for the Third Level. From one of these a slope in the Orchard Bed, a rock tun-

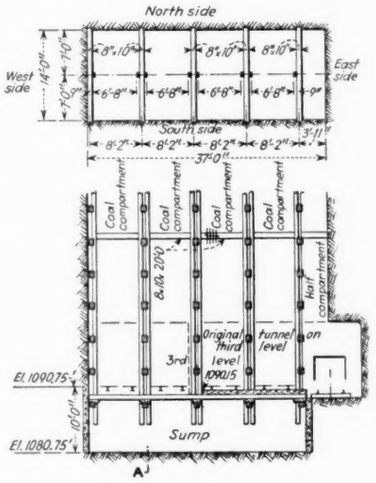


Fig. 2—Completed shaft section. No need for lining, as rock was hard.

nel, known as No. 152, was then driven in the northerly direction so that it intersected the proposed shaft.

The other two slopes were on either side of the basin, both in the Buck Mountain bed. A tunnel was then driven from both dips in the southerly and northerly direction to join with that started from the Orchard slope and so form the proposed approaches to the shaft bottom. This tunnel in all is about 1,300 ft. long; was driven 8 ft. high and 10 ft. wide by three shifts of men making about 13-ft. advance from each end every 24 hours. Subsequently, this tunnel was widened by a skip to 17 ft., to accommodate two tracks.

On July 1, 1938, the raise, or rock-

hole, under the shaft was started from the intersection of the 152 tunnel with the shaft (see *A*, Fig. 1), and was driven upward at an angle at 45 deg. to the horizontal for almost the entire 37 ft. of the longer dimension of the shaft. At this point a cut-back was made at an angle of about 82 deg. to the horizontal. This was extended upward almost to the bottom of the original sinking, which had meantime been pumped clear of water as far as possible.

A drillhole 15 ft. long was then drilled up toward the bottom of the original sinking. It was heavily charged with explosive and the explosive fired, but it failed to break into the shaft bottom. A 4-in. pipe was then driven from the Second Level through the *débris* in the bottom of the shaft immediately over the end of the raise from the Third Level. This was loaded with a box of dynamite, which was fired, breaking a hole through the shaft bottom, letting much of the *débris* and unpumpable water fall down the raise. The *débris* remaining was shoveled into the rockhole or, where large, being timber, fallen cars or the like, was lifted up to the Second Level. After that it was safe to sink the shaft from that level or to raise it from the lower level.

The purpose in driving at 45 deg. to the horizontal in one direction and then cutting back at 82 deg. in the other was to form an angle so that the rock would not fall directly onto the floor of the level. After the muck in the bottom of the old shaft was released and loaded away, a vertical raise was started for the full dimensions of the shaft. The roof of the level was drilled and blown down, and the drillers worked always on top of the fallen rock, which was not removed any faster than would assure the maintenance of the top of the rockpile at convenient drilling level.

What was later to be the half compartment on the east side of the shaft was provided with a "battery" of 8 x 10-in. timbers set skin to skin as a vertical wall against the raise, with other timbers of the same size set at right angles in three walls, one against each rock wall and one in the center line of the shaft, forming two compartments, one for material and one for a manway, and stiffening the first wall against the weight of the rock in the raise. All these walls were spiked solidly together, for they were subjected to heavy pressure.

When the rock was about to be shot, the manway and material way were protected by the placement of 8 x 10-in. timbers on a sharp inclination above these openings to prevent rock from passing down them. As the timbers sloped heavily they freed themselves of *débris* and readily could be pushed or barred to one side to admit drillers who, as soon as they entered, began to build up the walls of the manway and material way almost to the roof. In this way, the raise was extended until the sinking was met. It should be added that while the battery timbers in the shaft were 14 ft. long, those used in the Third Level to hold the rock in place were longer, especially at the floor, being graduated in accordance with their distance from the top of the level. Concurrently, rock was loaded on the south end of the shaft by a Myers-Whaley loader.

The rock work both in shaft and tunnels was contracted to Hugh G. Jeffrys, of Mount Carmel, who used Ingersoll-Rand drills and detachable bits. On some lifts 90 or 95 holes would be used, but 80 was the more usual number. Three shifts were worked in the raise and one shift in the sinking.

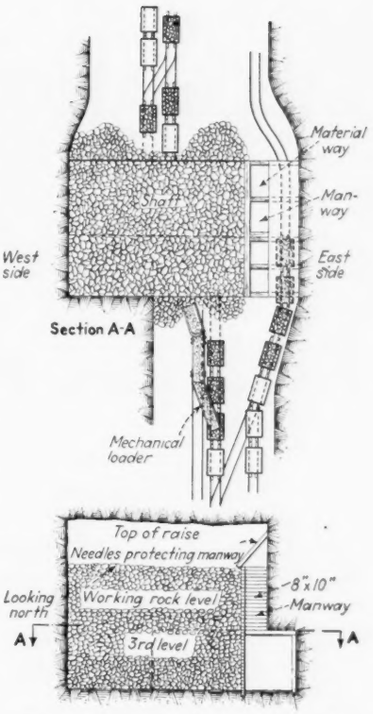


Fig. 3—Method of making final raise and loading broken rock.

The first cars of coal were hoisted in the west compartment on Sept. 26, 1938, and in the east compartment on Sept. 29. The sump was excavated between Sept. 2 and 5 and concrete poured for the shaft-bottom floor Sept. 8. By providing that cars can be caged on the Third Level, the two Buck Mountain and the Orchard slopes, which lifted coal to the Second Level, are eliminated for a more satisfactory and economical method of transportation.

All the work was in charge of K. F. Arbogast, coordinator; Hayden Owens, division superintendent, and G. C. Faust, division engineer, with Louis F. Gerdetz, consulting engineer.

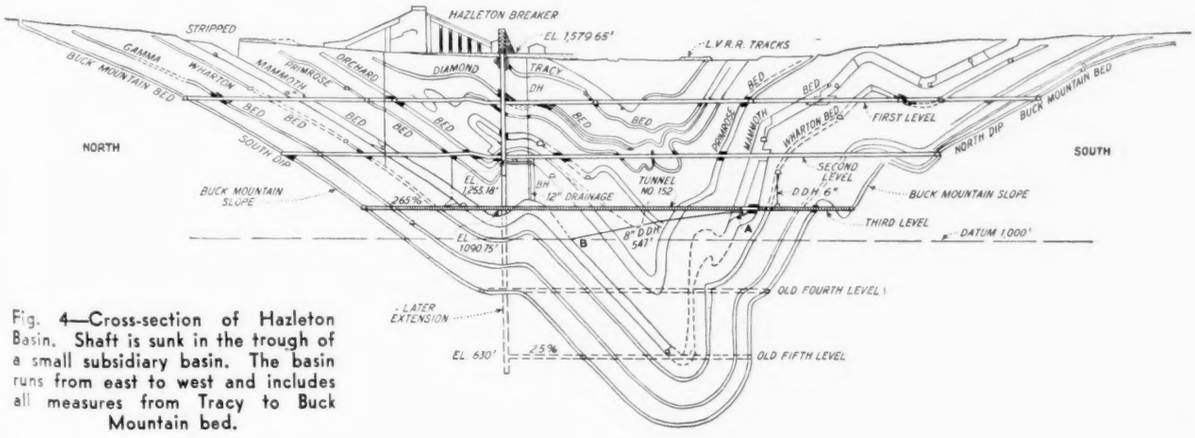


Fig. 4—Cross-section of Hazleton Basin. Shaft is sunk in the trough of a small subsidiary basin. The basin runs from east to west and includes all measures from Tracy to Buck Mountain bed.

MECHANICAL CLEANING

Plus Air Scrubbing and Centrifuging Feature the New All-Welded Ayrdale Plant

Substantial ash reduction, elimination of quality fluctuations and a rise in ash-fusion temperature are results of the erection of the new Ayrdale mechanical-cleaning plant. All coal is washed after reduction to 6 in., using a trough washer and an air-pulsated jig. Drying is done by a cold-air "scrubber" and a continuous centrifuge.

By IVAN A. GIVEN
Associate Editor, Coal Age

WITH the erection of the new Ayrdale washing, screening and drying plant near Jasonville, Ind., the Maumee Collieries Co. added "Airedale 5th Vein Washed Coal" to its list of trademarked fuels in 1939. With a different cleaning set-up, Ayrdale is designed to produce a uniform washed, screened and dewatered product the year around. Results have included, besides a substantial ash reduction (4 to 6 points in screenings), elimination of wide fluctuations in product quality, again most evident in screenings, and a rise of some 300 deg. F. in screenings-ash fusion temperature.

Lump was eliminated in plant design, based on reducing all coal to 6 in. and then washing the entire mine output in a trough washer and air-pulsated jig, the jig receiving, in addition to coal under 2½ in., crushed middlings from the second draw of the trough washer. Another plant feature is an "air scrubber" for drying 1¼- or 1x⅜-in. coal, supplemented by a centrifugal dryer for minus ⅜. A secondary settling tank, besides a primary unit, permits recovery of the finer slurry. Dewatering-screen design eliminates wedge wire.

Four loading tracks, three apron-type booms and a loading conveyor permit shipment of four sizes simultaneously. Mixing equipment also permits combinations up to and including 6-in. mine-run. By tracks, the sizes usually shipped are: No. 1, 6x4 or 6x2; No. 2, 4x2 or mixtures up to 6x0; No. 3, 2x1 or mixtures up to 6x0; No. 4, minus 1 in., 1x⅜ or minus ⅜, in addition to 2x⅜ or minus 2 in. via box-car loader. Part of the minus ⅜-in. product can be loaded while using the rest in combinations.

Character of the raw product decidedly influenced Ayrdale plant design. Besides the usual material left after cleaning with a bulldozer, the coal itself is laminated and contains, among other things, numerous horsebacks, clay veins and partings, including one major parting up to 12 in. thick. When this thick, the parting usually comprises about 3 to 4 in. each of slate, rash and slate. Because of the laminations and thin partings, it was felt an acceptable lump product was not economically feasible, so crushing and mixture with the other coal for washing was in order. Sulphur balls and lenses, plus "niggerheads," dictated, however, picking before crushing.

Float-and-sink investigations also indicated that single-unit washing would not yield the best product over the proposed range of sizes to be cleaned. Large coal, it was shown, could be washed at a gravity of 1.40 to 1.45, while about 1.55 was necessary for screenings. Consequently, two-unit washing was adopted, with the trough washer handling coarse coal (6x2½) because, among other things, of high capacity in relation to cost. Finally, it was decided to take a middlings product, crush it and run it to a fine-coal washer producing only clean coal and refuse. Thus, the possibility of large circulating loads of near-gravity material, which might result from returning middlings to the same washing units, was eliminated. Using a separate smaller washing unit for middlings re-treatment also was rejected as less satisfactory under Ayrdale conditions.

Coal is brought to the plant, designed by the Templeton-Matthews Corporation and built by Maumee, in two new 25-ton Austin-Western trail cars pulled by Dart tractors, plus a Dart truck with 15-ton end-dump body designed to take refuse to the pit and bring coal back. Haulage units dump into a 60-ton concrete-and-steel hopper. A double reciprocating feeder with adjustable eccentric moves the coal out into a chain-and-flight conveyor (34x10-in. flights) on a 35-deg. pitch up to the mine-run shaker.

Equipped with 50 sq.ft. of 6-in. round-hole plate, the mine-run shaker (5 ft. wide) discharges the plus 6-in. onto a picking-table extension. Natural daylight is supplemented by a Type HF-100 Hygrade "Fluorescent" lighting unit. Pickings go by belt to the main refuse conveyor, while picked lump falls into a 24x42 single-roll crusher for reduction to 6 in. and return to the main mine-run conveyor by belt.

Minus 6-in coal is conveyed to a 4x8-ft. Gyrex vibrating screen set above the washers, where it is sepa-

rated into 6x2½- and 2½x0-in. fractions. The former goes to a 36-in.-wide 125-tons-per-hour Link-Belt trough washer. The first such unit in a coal-preparation plant, the washer is equipped with two draws, with provision for an upward current in both.

Pure refuse goes to the refuse conveyor, while middlings are elevated to a Gruendler crusher for reduction to minus 1½ in. and incorporation in the fine-coal washer feed. Cutting out middlings for crushing and re-treatment permits regulating trough operation to provide an exceptionally clean coal end while recovering values in the middlings in the fine-coal washer.

Minus 2½-in. coal, plus crushed coarse-coal middlings, is fed to a four-cell two-compartment Link-Belt air-pulsated jig (175 tons per hour) with electric-eye reject control. Refuse from both elevators goes to the refuse conveyor, which carries plant waste to a 100-ton outside bin. The exposed section of the refuse conveyor is housed on the top and sides and insulated on the bottom with rock wool to prevent freezing. The loading station under the bin is housed to the ground to hold heat.

Shakers Also Dewater

Two classifying shakers following the washers also serve as dewatering units, including acting as the screening medium for an air-drying, or "scrubbing," installation. Washed 2½x0-in. coal flows over a slotted plate (⅜x¾-in. slots) which unloads nominally minus ⅜-in. material and water to the bottom deck, bottom shaker. Oversize and 6x2½-in. coal from the trough washer go onto the coarse-coal dewatering section of the upper shakers, 7½ ft. wide at upper end, 5 ft. at lower end and 56 ft. long. Fitted with approximately 113 sq.ft. of 1- or 1¼-in. round-hole plate, this section unloads minus 1- or 1¼-in. and water onto the lower shaker. Three decks comprise the lower end of the upper shaker, the top one (45 sq.ft. of round-hole plate) making 6x4-in. furnace; the second (45 sq.ft. of plate) making 4x2-in. egg; and the bottom (blank) receiving 2x1-in. nut. Furnace and egg fall into the proper compartments of one 2-compartment distributing and mixing conveyor extending across all four loading tracks, while nut goes into one compartment of a second such conveyor, across three tracks. With these conveyors, which also can receive all coal under 1 in., 6x4, 6x2, or 4x2 may be loaded on No. 1 track; 4x2 and mixtures up to 6x0 on No. 2; and 2x1 or mixtures up to 6x0 on No. 3.

Minus 1-in. coal and water through the 1-in. dewatering section of the upper classifying shaker fall onto the lower shaker, 49 ft. long, 8½ ft. wide at the upper end, and equipped with stepped slotted screens for taking out minus ⅜-in. material. The 1x⅜-in. (or 1¼x⅜-in.) oversize moves down into the upper hood of the "air scrubber." The two shakers are one above the other at the upper end, but fork at the lower to permit installation of the "scrubber" hood.

A second hood beneath the screen is connected by duct to a 42x18-in. Clarage exhauster (35,000 c.f.m., 4½-in. water-gage). Drying air is pulled in from the outside through a bank of radiators in the plant wall and down

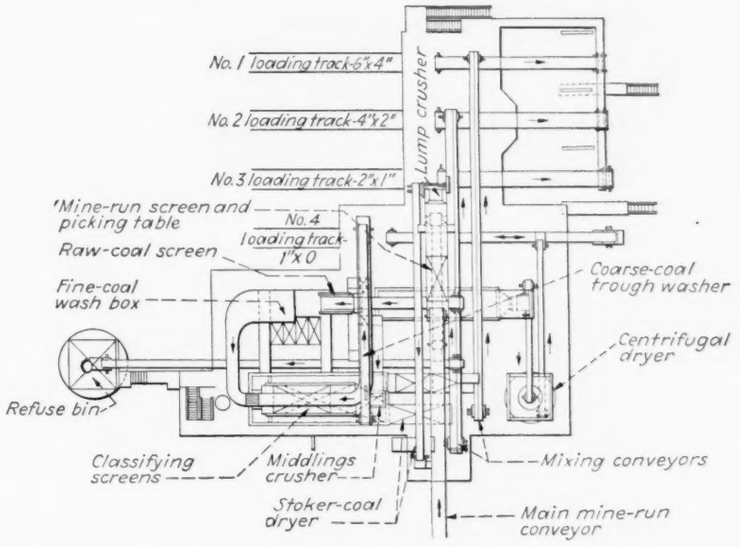


Fig. 1—General arrangement of equipment in the Ayrdale preparation plant.

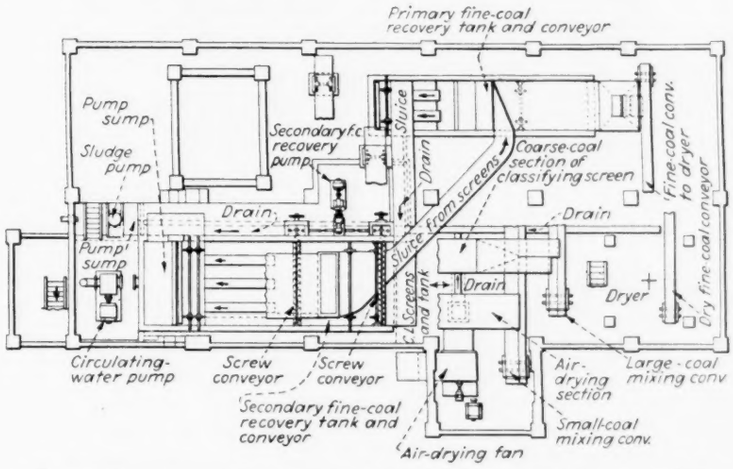


Fig. 2—General arrangement of equipment in the fine-coal recovery plant.

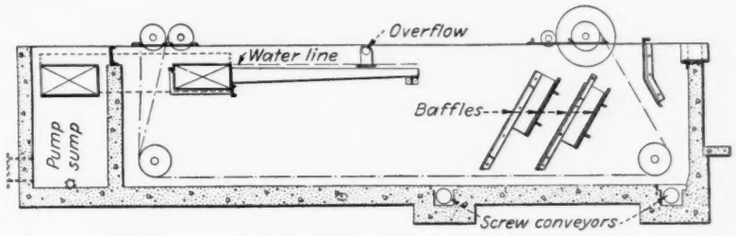
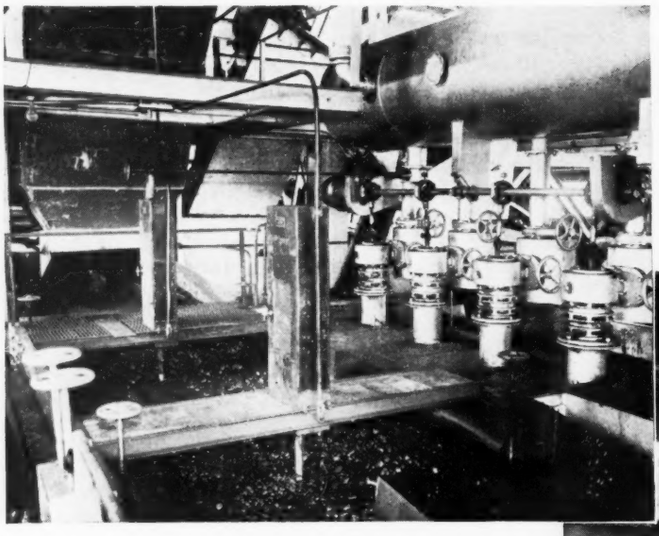
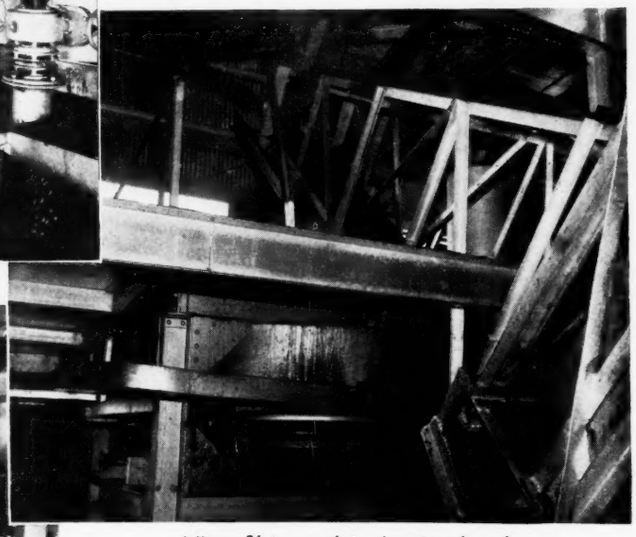


Fig. 3—Side view, secondary fine-coal settling tank, showing baffles and draws.

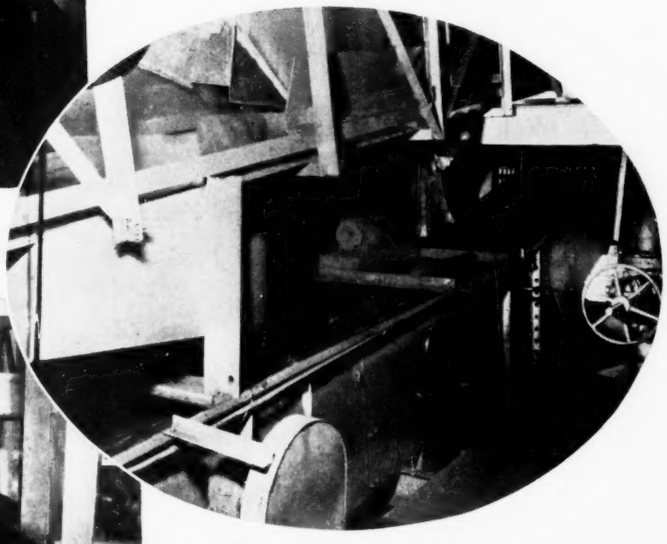


Minus 2½-in. coal plus crushed middlings from the trough washer are cleaned in this air-operated jig.

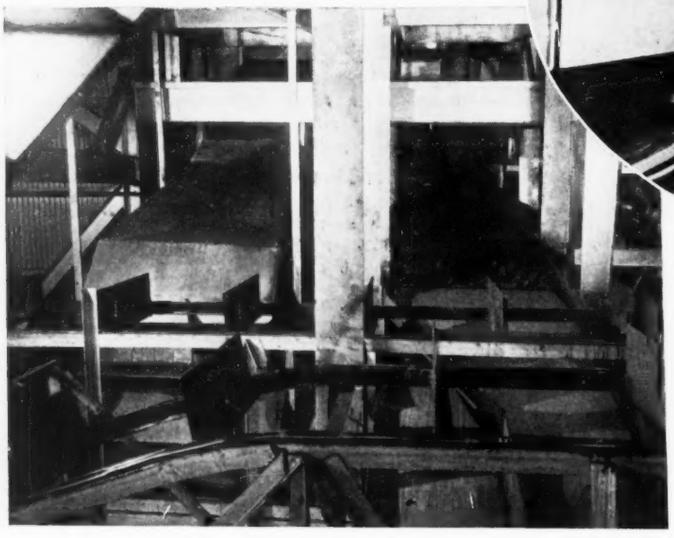


Minus ⅜-in. coal is dewatered and further purified in this continuous centrifugal dryer at Ayrdale.

Mine-run screen and picking table, with fluorescent lighting unit, ahead of the lump crusher.



This trough separator cleans 6x2½-in. coal at Ayrdale.



Lower ends of the dewatering and classifying screens, which fork at Ayrdale. Over the left-hand screen is the upper hood of the "air scrubber" for drying 1x⅜-in. coal.

through the coal on the screen. An old strip-shovel boiler supplies steam for this radiator bank and also the Modine unit heaters. The radiator bank serves only to keep the drying air above 45 deg. F. in winter, as the idea is to use normal-temperature air at high velocity to accomplish 50 to 75 per cent of the work done by 800- to 900-deg. combustion gases, or enough to reduce surface moisture below freezing except under extreme conditions. Naturally, eliminating furnace, stokers, insulated duct, controls, etc., materially reduces cost.

Experience to date indicates that total moisture in the 1x3/8-in. coal is reduced from about 16 to 14 per cent ("inherent" around 12 per cent), almost entirely by scrubbing action The high-velocity air also removes much of the colloidal-clay film, thus improving appearance of the dried coal, which goes into the second compartment of the 2-compartment fine-coal distributing conveyor.

All the minus 3/8-in. coal and water flow to a primary concrete settling tank baffled and otherwise arranged for a hydraulic size separation of the feed. Overflow, carrying nominally minus 50-mesh material, goes to a secondary concrete settling tank. Baffles assist in throwing down the larger particles near the feed end, with the smaller falling farther out. Two screw-conveyor draws are placed in the tank bottom, one at the feed end (larger material) and the other near the center (fines). As the fines tend to run high in impurities, they normally run to a sump and are pumped to waste (Fairbanks-Morse centrifugal). Coarse material from the other draw is returned to the primary settling tank by a second F-B centrifugal. Fines also may be returned to the primary tank, but, for the above reason, this ordinarily is not done. Clarified water from the secondary tank is recirculated to the washers by an F-B centrifugal.

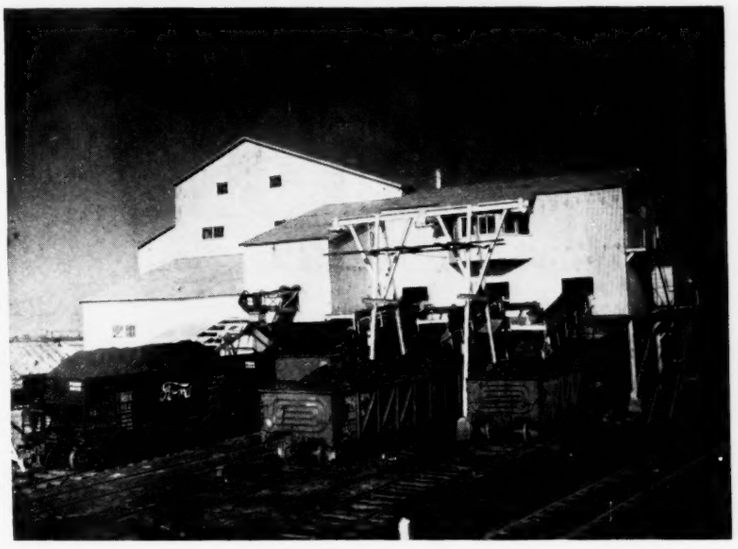
The 3/8-in. x 50-mesh coal removed from the primary tank by the drag conveyor feeds onto a small high speed screen taking out part of the water. Coal leaving this screen carries a total moisture of about 30 per cent (about 18 per cent surface), and is elevated to an Elmore continuous centrifugal dryer (60 tons per hour), although it may be bypassed for loading wet. The dryer reduces total moisture to about 17 per cent (approximately 5 per cent surface), and also whirls out clay and similar impurities to reduce the ash percentage in the 3/8-in. x 1/4-mm. about 2 points. Dryer effluent is wasted by the sludge pump.

94 Per Cent Recovery

About 94 per cent of the dryer feed is recovered as dried, cleaned coal, which is elevated to a scraper conveyor moving it one way to an outside loading station or the other way, on the other strand, to the 2-compartment fine-coal mixing conveyor to join the 1x3/8-in. size. An adjustable gate also makes it possible to split the 3/8-in. dried coal as desired between car and 2-compartment conveyor. Gates in this latter conveyor, in turn, make it possible to run 1x3/8- or 2x3/8-in. coal into the loading and transfer conveyor for loading 1- or 2-in. screenings or a 1x3/8- or 2x3/8-in. product if desired. A Maumee-built box-car loader is installed for loading 2x3/8-in. on this (the No. 4) track; also, other sizes up to 2-in. screenings.

The Ayrdale plant, with Judge C. Garwood as foreman, was erected by welding, a long-standing Maumee practice also applied to many equipment items, such as conveyors, etc. Three loading booms with Euclid hoists are installed. Motors, of the squirrel-cage type, with splashproof units where necessary, are primarily Fairbanks-Morse, with some by Allis-Chalmers and others. All motors operate on 440 volts (General Electric magnetic starters), as compared with 110 volts for the lighting circuits. Any motor may be started regardless of position, but if one stops (trouble or pressing an emergency stop button), all back of it stop automatically. Wiring is carried in rigid conduit, with flexible conduit for motor connections. Transmission equipment consists primarily of Falk speed reducers, some with auxiliary roller-chain connections, and Texrope V-belt drives. Link-Belt reducers and auxiliaries are used with the washing equipment.

Fresh water for make-up comes from the old Ayrdale deep mine, tapped by a borehole for a Gilmore deepwell pump. An old strip pit about 1,000 ft. from the plant acts as a storage pond. Here, a Fairbanks-Morse centrifugal relays the water to sprays on the classifying screens.



Where "Airedale 5th Vein Washed Coal" originates. This view shows the four loading tracks.

CONVEYORS IN 3-FT. COAL

Get 700 Tons in Two Shifts From a Four-Panel Section in Starr Mine

First to use conveyors in the Henryetta field of Oklahoma and confining development to the summer season, the Starr Coal Co., recovering the 36-in. Henryetta seam, gets 675 to 700 tons per day of two shifts from four panel-conveyor units in winter. Panel faces are 90 ft. long. The four panel conveyors discharge into a gathering conveyor which in turn feeds the coal into a trip-loading elevating conveyor. Carbon dioxide is used to break down the coal to increase coarse-coal yield.

FIRST to install conveyors and thus initiate the present mechanized-mining cycle in the Henryetta field of Oklahoma was the Starr Coal Co., which now produces 675 to 700 tons per day of two working shifts from four working places about 90 ft. wide in 3-ft. coal. Chain-type equipment is used exclusively, along with carbon dioxode for breaking down the coal.

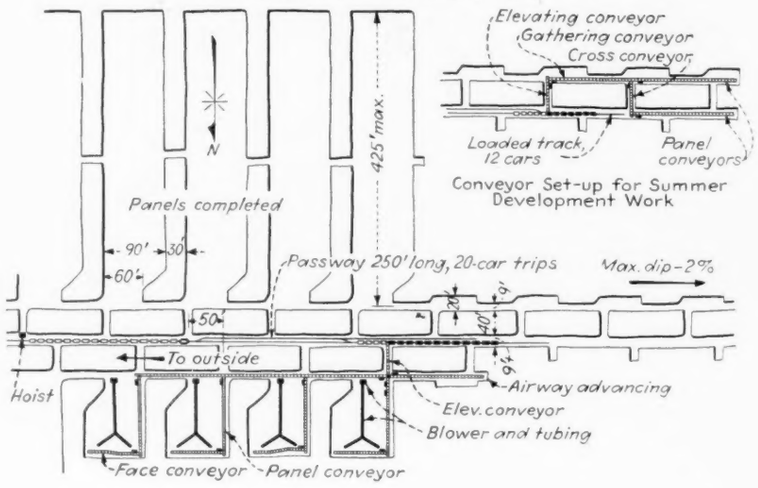
The major reason for the adoption of conveyors naturally was a desire for lower mining costs which would permit competition with coal from other fields, as well as with natural gas and oil. And as lump is the premier size in the market territory served by the Henryetta field, a method of breaking down the coal when required that would preserve the lump yield was highly desirable; this led to the selection of carbon dioxide. Foreseeing, however, a substantial growth in the demand for stoker, Starr this year also rebuilt its tipple to produce this size and also make it possible to load six different sizes at a time with only four tracks. This was supplemented by equipment for dustless-treating.

Starr mine, in common with other operations in the field, recovers the Henryetta seam with a clean thickness of around 36 in. Conveyors at present are being operated in a section about 1½ miles from the tipple, where the cover is around 170 ft. General dip of the coal is about 2 per cent maximum to the west. Over the coal is about 15 ft. of hard slate. In panels, this slate stays up without difficulty, but in airways, due to the jar of the harder shooting and consequent air slacking, some 4 to 8 in. comes down after some months. In haulage headings, enough slate normally is taken down to give a clear height of 6 to 7 ft. over the rail.

Conveyors first went into service at Starr mine, where Charles Sizemore is superintendent and W. E. Ellis chief electrician, with M. A. Berman as president and general superintendent, in May, 1938. Four panel units were put in at the start, but at that time each panel conveyor had a separate loading point. The difficulty of handling cars and making up trips under this arrangement resulted in a switch to the gathering-conveyor system in November, 1938, with one loading point. So far, a regular panel conveyor has been used for gathering purposes, but it is to be relegated to airway advancement, as will be described below, and a regular gathering conveyor substituted.

Because demand drops sharply in summer, and the call for lump is reduced, entry-driving is done only at this period of the year, during which sufficient entry is driven for expected winter's work. As shown in the diagrammatic sketch of the working plan in Fig. 1, mining is done on the advance, which also is downgrade, on a panel entry. Until the present season, summer development was based on

Fig. 1—Showing diagrammatically the conveyor-mining plan at Starr mine, along with the proposed entry-driving system.



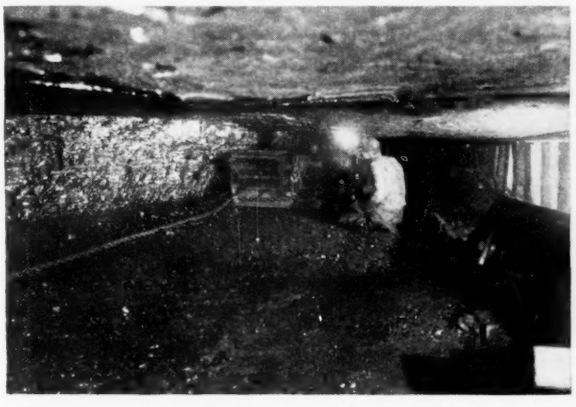
driving a central haulageway and two side airways, all three places 9 ft. wide. Next summer, however, only the haulageway and the airway on the south will be driven, and except at panel pillars, airway width will be 20 ft. This will provide not only more room for setting up the panel units in starting off a new block but also space for gobbing the top, which shells down after the heading stands for some months.

The conveyor set-up proposed for driving the two headings is sketched in Fig. 1. The gathering conveyor is placed in the airway, from which the elevating conveyor used to load cars comes through a crosscut, which also is a panel connection, to the haulage heading. Headings then are driven with regular panel conveyors, with a cross conveyor between the haulage-heading unit and the gathering unit. As can be seen in Fig. 1, the distance from the loading point to the next crosscut is available for track for sixteen-car loaded trips. When the headings are extended about three panel connections, or around 360 ft., the haulage heading is brushed and the loading station moved forward. In the past, with 9-ft.-wide openings cut about 6 ft. deep, the usual advance was three to four cuts per shift.

Driving of the second airway, on the opposite side, will be done, under the new plan, as the panels on that side are advanced (Fig. 1). In other words, a chain conveyor will be laid ahead of the gathering conveyor and as one cut is taken out of the panel faces a cut also will be taken out of the airway face. Thus, when the four panels are completed, the airway will be extended the necessary distance and four more places will be ready.

Panels at Starr are driven approximately 90 ft. wide on 120-ft. centers, leaving pillars 30 ft. wide, which are cut through once in driving to the usual depth of about 425 ft. from the gathering conveyor. Panels are started off the airways about 60 ft. wide and then are gripped out on one side to the full width, thus making "walls" 90 ft. long. As stated, panels are driven in groups of four which are called "set-ups," and the practice is to work a set-up on one side, then the next set-up, and then cross over to the opposite side. Panels on the two sides are offset 50 ft. Each set-up produces around 13,000 to 14,000 tons, which means that it is completed in around twenty working days of two shifts each. Moving from one set-up to the next requires about four shifts. Miller Cable Connectors are used to save time in electric connections.

Equipment for a four-panel set-up consists of one Jeffrey 61-W elevating conveyor (5-hp. motor at present), one gathering conveyor (to be a 61-EW unit with 15-hp. motor), four 61-AM panel conveyors with 10-hp. motors, four 61-HG face conveyors with 5-hp. motors, four 30-hp. Sullivan CE-7 cutters with 6½-ft. bars (one equipped with a Bowdil chain and bits in August, 1939) and four Jeffrey 1½-hp. tubing blowers feeding air to the faces through 12-in. duPont "Ventube." Branches in the tubing direct the air to the corners in each panel. Trips of cars are moved through the loading point by a 10-hp. single-drum hoist. With this equipment, about two cuts

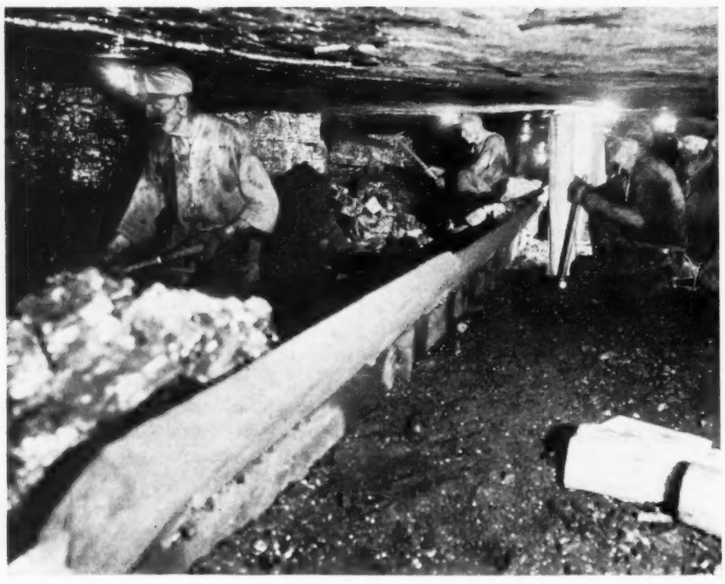


Cutting machine working across the face in front of the conveyor. The sump hook on the machine is used to pull the conveyor forward.

Loading a snubbing hole with a shell containing 10 oz. of carbon dioxide to bring down a section of a wall ready for the loaders.

Here the gathering conveyor and a panel conveyor are discharging into the elevating conveyor. In the rear are W. E. Ellis, chief electrician, and Charles Sizemore, superintendent.

A mine car getting a load of about 3,000 lb. in Starr mine. Cars are brought to the loading point by a main-line locomotive and are dropped past the elevating conveyor by a hoist.



Loading along the wall in Starr mine. The face conveyor has just been moved up and a new row of timbers is being set.

6 ft. deep and 90 ft. long are taken off each wall each shift.

Pan length in the case of panel conveyors is 6 ft. 1¾ in., and a total of 65 to 67 pans, plus 11 ft. for head and tail pieces, are in service when a panel reaches its maximum depth. Pans on the face conveyors are 5 ft. long, with head and tail pieces taking up about 8 ft. When the face conveyor is fully extended, thirteen pans plus head and tail units normally are in service. Face units also are used as cross conveyors when driving entries in summer.

All face equipment operates on 220 volts, a.c., with the blowers and cutting machines on one circuit and the conveyors on another. In the case of the conveyors, a master switch at the loading head cuts off everything when desired. A subsidiary switch operates the elevating and gathering conveyors, with a third switch to put power on the panel and face-conveyor circuits. An indicating light at each face with a pushbutton control cable shows the face crews when power is on and enables them to start or stop the panel and face conveyors at will when power is available.

Face operations at Starr are continuous except for stops to add pans to the panel conveyors, and crew members, such as cutters, turn to any other needed tasks when not engaged in their own work. Assuming cutting as starting in the right-hand corner, the machine works its way across the face, using the sump hook from time to time to pull the conveyor up behind it. With the conveyor in the new position, a row of timbers on about 3-ft. centers is set behind it. Thus, each time the conveyor is moved up, a new row of props is set.

When the loaders finish on the opposite end they come back behind the machine and start to work. Usually, one Cardox shell is fired in the corner to break the coal down along the rib, and thereafter shells are used only as necessary, with the most of the coal being removed by picks, bars and wedges to get the maximum yield of lump. When the machine cuts through and finishes pulling the conveyor forward a new room-conveyor pan is added. Meanwhile, the cutting machine is skidded back toward the right-hand corner, passing the loaders when a space is cleared, and there starts a new cut.

A hand auger on a post is used for drilling and the coal is broken down with two sizes of Cardox shells. No. 2-50 shells, loaded with 1 lb. 10 oz. of carbon dioxide, are used in the corners. When shooting is necessary elsewhere on the face, B-20 shells with 10 oz. of carbon dioxide are employed. Normally, the coal breaks down after it is undercut sufficiently so that the most of it can be taken out without shooting, and as a rule not more than four snubbing shots are required on a 90-ft. wall, and sometimes none or only one. Starr installed its own shell-charging plant when it adopted conveyors and has found that with conveyor mining and Cardox shooting, even though the coal is on the fragile side, there has been a substantial decrease in the percentage of minus 1¼- and 1¼x3-in. sizes, with a corresponding increase in the proportion of larger coal.

Coal is hauled from the working section to the outside in cars averaging 3,000 lb. The usual trip is twenty cars, and motive power is supplied by an 8-ton Goodman trolley locomotive. The main line is laid with 65-lb. rail, with bonds of scrap 4/0 wire applied with a special Ohio Brass copper electrode. This weight of rail is carried on past the loading station with, at this point, a second track which serves as a passway and storage for about twenty cars. Empty trips, as indicated in Fig. 1, are dropped down past the loading point by the hoist. When loading is completed, the hoist pulls the trip back to the passway. The incoming locomotive cuts off from the new trip at the head of the passway and runs in against the loads, letting the empties drop by. The locomotive then leaves with the loads and the hoist takes on the empties.

The Starr tipple originally was built in 1919, and just before the revisions were completed in the autumn of 1939 was a four-track job with a shaker screen for separating the coal into plus 6-in., 6x2½-, 2½x1¼-, 1¼x⅞- and minus ⅞-in. sizes. However, only four sizes could be loaded at a time, which meant that at least two had to be recombined. Last autumn, a Jeffrey-Traylor electric vibrator with Heller piano-wire cloth was installed under the main shaker. This screen now receives, when desired, the ⅞-in. slack and rescreens it into ⅞x$\frac{5}{16}$-in. stoker and $\frac{5}{16}$-in. slack. The slack goes directly into a car under the screen, while the stoker is discharged onto a 16-in. reversible belt conveyor (Jeffrey) which carries it either uptrack or downtrack to a stoker car. By making the belt reversible, it is possible, in case a slack car is completed before the stoker car, to drop both of them through, stopping the stoker car below the tipple to complete the loading while a new slack car is started.

No. 2 track, under the present system, is used for loading 6x2½, while No. 3 accommodates either plus 2½ or plus 6. On the outside track, 2½x1¼ is loaded at the tipple, while another belt takes 1¼x⅞ three car lengths uptrack to a second loading point. Carrying this size this distance provides ample room for storing and maneuvering cars. Other tipple revisions were accompanied by the installation of equipment for dustproofing 6x2½, 2½x1¼, 1¼x⅞ and ⅞x$\frac{5}{16}$ stoker with a cold-oil emulsion.

CONTINUOUS FACE POWER

Assured by Load Distributors

On M. G. Sets at Union Colliery Co. Operation

By FRED W. RICHART
Special Contributor
Carterville, Ill.

WHILE mechanized mining has tended to load coal-mine conversion equipment more evenly, it also subjects d.c. distribution systems to high peaks which frequently interrupt service to an annoying degree. This is particularly true where small motor-generator sets must handle periodic haulage loads in addition to face equipment.

To overcome just such power interruptions in its Kathleen mine, Dowell, Ill., the Union Colliery Co. has installed in connection with a 150-kw. General Electric portable m.g. set an I-T-E "load distributor." This m.g. set furnishes 275-volt power to an operating unit consisting of two shearing machines, four loading machines, four 6-ton gathering locomotives and one 8-ton relay locomotive. In addition, it takes the bump from approximately fifteen trips of coal out of the territory every day (8- and 15-ton haulage locomotives).

The m.g. set in question operates in parallel with a large set 6,200 ft. away, the tie consisting of two 500,000-circ.-mil feeders and a 4/0 trolley wire (positive) and two 500,000-circ.mil cables and two 40-lb. rails (one 4/0 bond per rail) (return). The load distributor, completely self-contained on a 15x28-in. ebony-asbestos panel, is mounted on one side of the d.c. control panel of the m.g. set (see accompanying illustration). Its function is to reduce the generator voltage when peak loads occur and thus hold the ampere load on the generator below the tripping setting of the circuit breaker. This permits drawing assisting current from the paralleled machines, prevents outage of the protected generator, and permits continuation of service at the momentarily reduced voltage.

The series-relay coil of the distributor is connected in the positive lead of the generator. The relay-contact and adjusting resistors are connected into the shunt-field circuit. The simplicity of the unit is shown in the wiring diagram (Fig. 1). Four steps of resistance are included in the distributor for load adjustment.

The distributor was installed at Kathleen Sept. 22, 1939. It is oper-

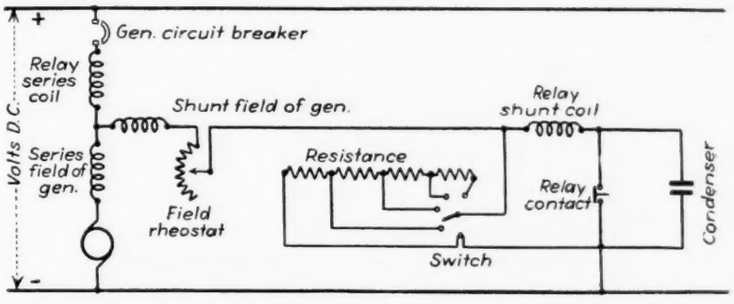
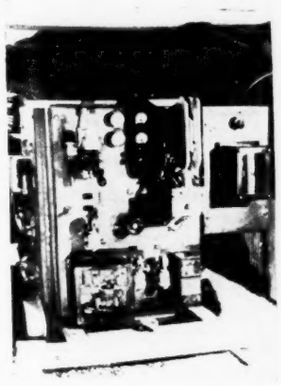


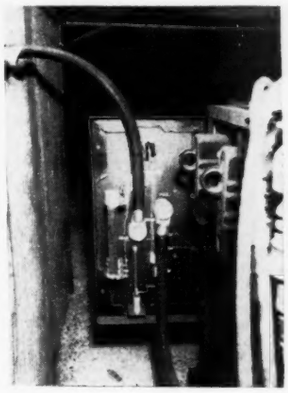
Fig. 1—Showing how load distributor is connected.



Load distributor (right) on set.

Close-up of load distributor.

Load distributor with cover off.



Rear view of load distributor.

ating on the second tap of the resistor and permits uninterrupted face operation. The relay picks up at about 625 amp. When a main-line locomotive is near by the load increases to about 800 to 850 amp. and the voltage drops to 240 or 230. At the same time power service to the face is continued. Before, there were ten to fifteen circuit-breaker operations each time a loaded trip went out of that entry. The advantages resulting from the first distributor installed have resulted in the ordering of a second unit for another m.g. set.

RUBBER-TIRED HAULAGE

Supplements Loading Machines

At New Paradise Mine in Western Kentucky

Loading machines and rubber-tired haulage equipment are employed in recovering about 5 ft. of No. 9 coal at the new Paradise mine in western Kentucky. The mine was opened by a belt slope 438 ft. long on an 18-deg. pitch also driven by loading machines and completed, including timbering, in 93 days of three shifts each. Loading stations underground are made by sinking the track.

REPLACING old Crescent No. 2, the new Paradise mine of the Crescent Coal Co., Crescoal, Muhlenberg County, Ky., is designed for a two-shift capacity of 4,000 tons per day. Opened by a belt slope, the operation is completely mechanized with loading machines and rubber-tired haulage units. A complete six-track mechanical cleaning and screening plant (see p. 53) serves the operation.

Paradise started shipping under the "Paradise" trademark in June, 1939. Representing an outlay of over $500,000, the new operation translates into actuality a long-standing dream of William H. Lindsey, president, Crescent Coal Co., and chairman of the board, the Paradise Corporation, who has moved from Nashville, Tenn., to Muhlenberg County, to be constantly on hand. This means, literally, both day and night at times for both Mr. Lindsey and Charles M. Rodman, who has devoted most of his life to the Crescent interests and was largely responsible for the design of the new operation.

Paradise production comes from the No. 9 seam of western Kentucky, ranging from 4 ft. 10 in. to 5 ft. 2 in. in thickness. Under the coal is fireclay and over it is a black slate. Occasional horsebacks in the roof have resulted in the generous use of timber at all times. Banded impurities are absent and the coal is lower in ash and stocks better than average No. 9.

Cover depth at the slope and air-shaft bottoms is 153 and 154 ft. Back under the hill, however, the average is around 200. General dip is about ½ per cent northeast, and the coal lies fairly regularly. The belt slope was driven on an 18-deg. pitch, 7 ft. high and 16 ft. wide. Timbering brought clear dimensions down to 6x14 ft. Slope length is 438 ft. The original timbering on 105 ft. at the top, due to the character of the rock, was replaced with a concrete arch and sidewalls.

The slope was driven with a Joy 8BU loading machine in 93 days of three shifts each. However, the machine was not in service daily, as timbering followed sinking and sets were kept within 12 ft. of the face as far as possible. Only twice was the hoist rope hooked to the loader, as the slope was dry and the machine, with a few ties under the cats when necessary, had traction at all times. When drilling was being done, average advance per day was 19 ft.; maximum, 35 ft. in 24 hours. However, as stated, drilling was discontinued when necessary to extend timbering.

Material encountered varied from shale to a hard flintlike clay, including sandstones and limestones. Sinking and timbering crews were made up of twelve men on one shift and eleven on the other two. Sullivan 7x9 electric and Ingersoll-Rand gas compressors feeding a single receiver supplied air to up to three Chicago Pneumatic drills. Holes per round (6-ft.) varied from 12 to 36. Blasting was done with 40- and 60-per-cent gelatin. A Joy tubing blower supplied air.

Rock was removed in a special car by a single-drum Ottumwa hoist now fitted with a ¾-in. 6x19 plow-steel rope and 50-hp. motor for handling equipment and supplies. Rock, or spoil, was dumped in trucks and used in road building. Drilling, shooting and mucking with the loader was the usual operating cycle, supplemented by timbering as required to keep sets within 12 ft. of the face. Below the concrete lining, 10x12 oak bars on legs of the same size were used, with sets usually on 4-ft. centers. Three-inch lagging was used over the top, with old 3x5 ties part way up the sides.

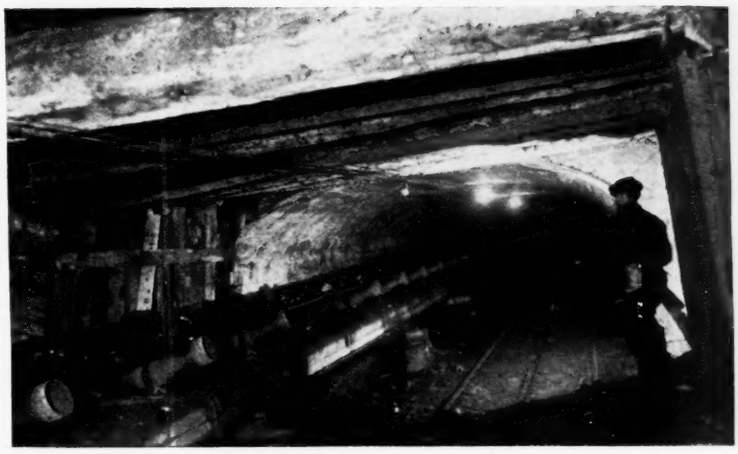
When the slope hit the coal, openings immediately were started to uncover the site of the mine-run storage

bin while the slope was continued on down below the bin site. To start the bin, a 4-ft. square hole was put down to the slope and excavation was begun around it. Bin size is 40x12 by 10 ft. deep. Sides and ends were left in their natural state except for a steel plate on one end where dumping commences. Capacity of the bin, designed for bottom-dump cars, is 96.7 tons. Timbering over the bin consists of 12x12 bars on 12x12 legs resting on mud sills. Over the bars is 4-in. lagging.

The slope width of 14 ft. permitted installation of both a 42-in.-gage supply track and a Joy conveyor with 36-in. 6-ply Goodyear special belt. Conveyor length is 620 ft. 8 in., center to center of pulleys. Coal is moved out of the bin onto the belt by a variable-speed plate feeder (150 to 275 tons per hour) operated by a 7½-hp. motor. The belt drive is a 75-hp. Type HV Fairbanks-Morse motor (705 r.p.m.) through a Link-Belt 39.64:1-ratio (720:18.6-r.p.m.) speed reducer. A Link-Belt backstop is installed between motor and reducer. The conveyor is started from the tipple, with emergency buttons at various points along its length.

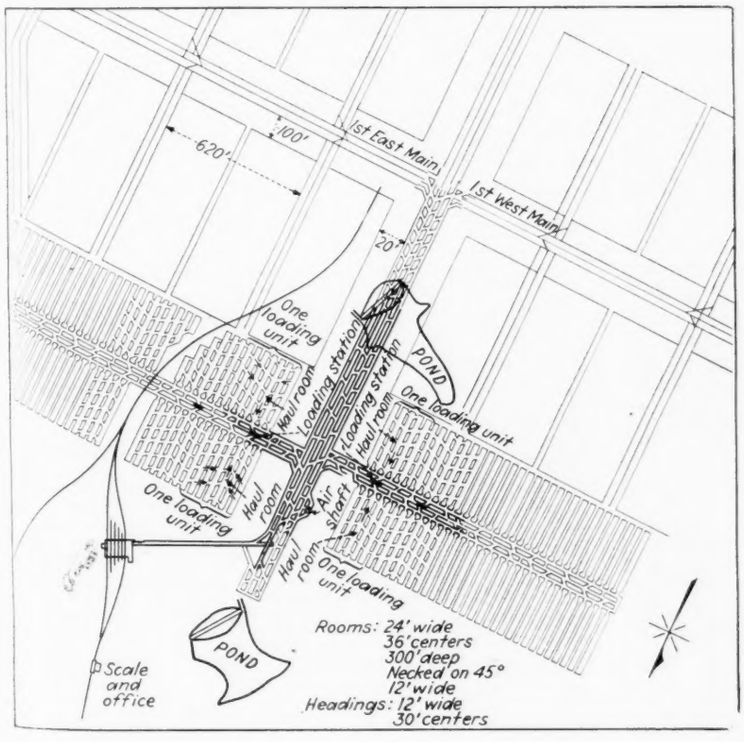
To supply air to the mine, a 10x16-ft. shaft 154 ft. deep was sunk by a contractor, using an old Buick engine as motive power for the sinking buckets, etc. The shaft is divided into a 10x10-ft. air compartment and a 6x10-ft. stair compartment separated by a curtain wall. The lining is concrete for 64 ft. with timber the rest of the way. A 6-ft. single-stage Aerovane fan, rated at 100,000 c.f.m., is installed, although demand probably never will exceed 60,000 c.f.m.

Development at Paradise is based on a main entry, cross entries and panel, or room, entries, driven as in Fig. 1. The main entry comprises four headings 12 ft. wide on 30-ft. centers. Three 12-ft. headings, 30-ft. centers, make up cross and panel entries. Bottom is taken in all haulage openings to provide a clear height of 5 ft. over the rail and under the steel bars on 4-ft. centers. Lifting 12 to 15 in. of fireclay usually is sufficient to provide this height.



Paradise slope from a point just below the concrete lining at the top.

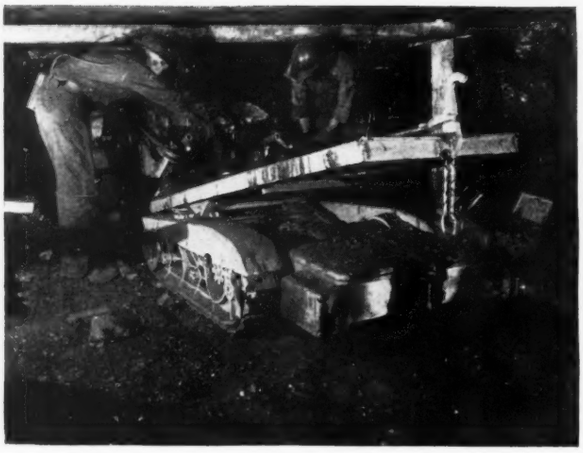
Fig. 1—General development plan at Paradise mine. Room territories off the slope bottom are supplying quick coal, but, beginning this year, regular cross and room entries will supply the major tonnage.



The main line is laid with 70-lb. steel (O-B bonds, West Virginia frogs and switches, etc.) on 5x6 native white-oak ties 64 in. long. Timbering consists of 12-ft. bars of 80- and 90-lb. rail on round legs with a minimum small-end diameter of 8 in. Between each pair of bars is placed four 4x4 ties 4 ft. long, which serve as both stringers and lagging. The ties are beveled on the top at both ends and are driven in the groove formed by the base and the ball of the rails. The bevel lets the ties extend above the rail tops against the roof.

Production equipment at Paradise consists of Joy 8BU loading machines, Goodman universal shortwalls with 7½-ft. bars, moved about on Joy caterpillar trucks; Chicago Pneumatic post-mounted drills with Hardsocg conveyor augers, heads and bits, and Joy 3½-ton shuttle cars with 275-amp.-hr. Philco batteries. When this article was prepared, four loaders served by five shuttle cars were in service, the extra car helping out as needed. The original intention, however, was to have two cars per loading machine, and as fast as they are received they will be placed in service.

Two working shifts per day is the schedule. Mine operations are supervised by George Walls, superintendent, assisted by Face Bosses Ward Padgett and Harry McKee (day shift) and B. T. Campbell and Henry



Loading up a shortwall cutter on its caterpillar truck after cutting a place in Paradise mine.

Loading machine at work in about 5 ft. of coal in a room, with a shuttle car receiving the coal.

Murphy (night). Richard Hundley is master mechanic. High production is secured from each loader by, among other things, putting in loading stations every 200 ft. on the middle heading (Fig. 1). In addition, room and crosscut layout makes one room serve as a haulway directly to the loading station. Thus, even with a depth of 300 ft., the normal maximum, the one-way haul in rooms is not over 450 ft., while the average over a group of five to seven rooms usually is not more than 300 ft.

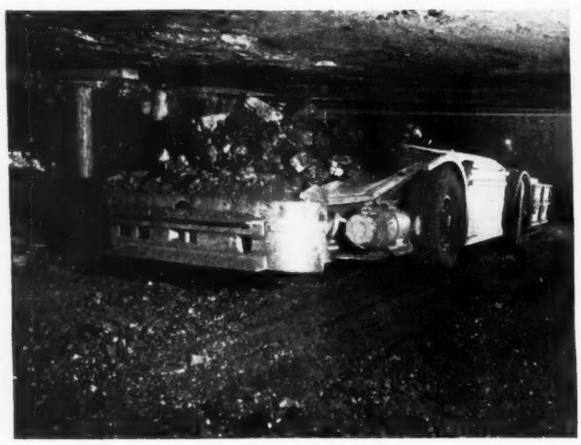
On cross and room entries, center-heading loading stations are placed about as in Fig. 1. Such loading stations are made by taking up a maximum of 27 in. of bottom to sink the track at the dumping point. Normally, only 12 to 15 in. is taken the full width of haulage headings. When a loading point is to be established, however, thickness of lifting gradually is increased to form a dip with its lowest point 27 in. below the bottom of the coal. Enough track is laid through the dip for a trip of six to eight cars—moved through the loading point by a locomotive.

Each loading point on a room entry serves five to seven rooms—usually six—on each side. In other words, two loading units work from one station. Rooms in a group are picked up through 45-deg. crosscuts from the center haul room, these angle crosscuts directing traffic to the center place and also facilitating shuttle-car travel by eliminating right-angle turns. Rooms are driven 24 ft. wide on 36-ft. centers. Normal depth is 300 ft. Necks are about 12 ft. wide and 15 to 20 ft. deep before widening. At the loading stations, timber platforms are built on each side of the track. A shuttle unit from one side runs out on one platform to discharge its coal into a mine car in the bottom of the dip, while the car serving the machine on the opposite side uses the opposite platform.

Loading stations are moved Saturday night and Sunday. Stations are refilled after serving their purpose, and when it is time to move, the bottom in the haulage heading is drilled ahead the necessary distance for a new station a day or two in advance. Then, starting 2:30 p.m. Saturday, the bottom is shot, the track in the loading station taken up and the platforms are dismantled. Broken material is loaded into the shuttle car and taken back to fill up the old dip. Excess material originally was sent outside for road building but now will be gobbed, in the case of room entries, in worked-out places.

For drilling the bottom, a new Sullivan WK-7OE rubber-tired compressor (85 c.f.m.) was installed Nov. 1, 1939. Wheel gage is 42 in.—also the track gage—and when the compressor is brought out on the main line the air pressure is reduced and the unit run on the rails. Platforms are bolted together to facilitate dismantling and

Shuttle car leaving the face on its way out the loading station with 3½ tons of room coal at the new Paradise mechanical mine.



While another waits on the opposite side, a shuttle car on a timber platform gets ready to unload in the mine car beneath.

reerection. Work normally is completed and a new loading station is ready by 6 p.m. Sunday.

Face operations at Paradise follow the usual routine of timbering, cutting, bug-dusting, drilling, shooting and loading. Both single posts and bars are used, as the occasion warrants, and each crew usually includes two timbermen. In cutting, the aim, where possible, is to leave a bottom about 1 in. thick, which serves to keep the loading head up out of the clay. But if rolls, etc., result in a thick bottom, it is taken up to preserve working height.

A room 25 ft. wide normally is shot with four holes in the top, started about 18 in. down and angled nearly up to, but not touching, the slate in the back. Holes are loaded with 1¾x8-in. du Pont permissible.

Coal moves from the loading stations to the slope bottom in 129-cu.ft. Sanford-Day "1-2-3" drop-bottom cars (14-in. S-D "Floater wheels, Fafnir ball bearings). Cars are 28 in. high and 6 ft. wide and 12 ft. long inside. Nine cars compose the usual trip at present, but the number will be increased as production rises. When this article was prepared, coal was hauled the short distances to the bottom by a 10-ton Goodman trolley and a 6-ton Mancha (Exide-Ironclad) battery locomotives. As more loading units are installed, the 10-ton unit will go into main-line and the 6-ton machine into cross-entry service. Trips then will be handled at the loading stations by small car-pulling hoists.

WASHING AND DEDUSTING

Included in Preparation Set-Up

At Crescent Coal Co's. New Paradise Mine

All coal from 6 in. down may be washed at the new Paradise preparation plant also equipped for stoker-coal production and dedusting screenings at 10 and 28 mesh. Six loading tracks and mixing equipment permit shipment of six sizes simultaneously, as well as 28 different combinations. Chloride washers are installed for 6x2-in. coal, with straight wet equipment for 2x0, and provision is made for reclaiming coal from middlings.

MECHANICAL LOADING underground is matched by mechanical cleaning on the surface for efficient production of fuel conforming to present-day standards of quality and uniformity at the new Paradise mine of the Crescent Coal Co., Crescoal, Muhlenberg County, Ky. Preparing No. 9 coal running lower in ash than the average for this seam, the new plant is designed to wash all coal from 6 in. down to 2 in. in chloride equipment, with a straight wet washer for minus 2-in. Shaker and vibrating screens, main and auxiliary mixing conveyors, and six loading tracks permit shipment of six sizes simultaneously or mixtures of any two or more up to and including hand-picked and washed mine-run, as well as screenings dedusted at 10- and 28-mesh and 1¼x¾ down to ⅛-in. stoker coal. Five tracks are equipped with loading booms.

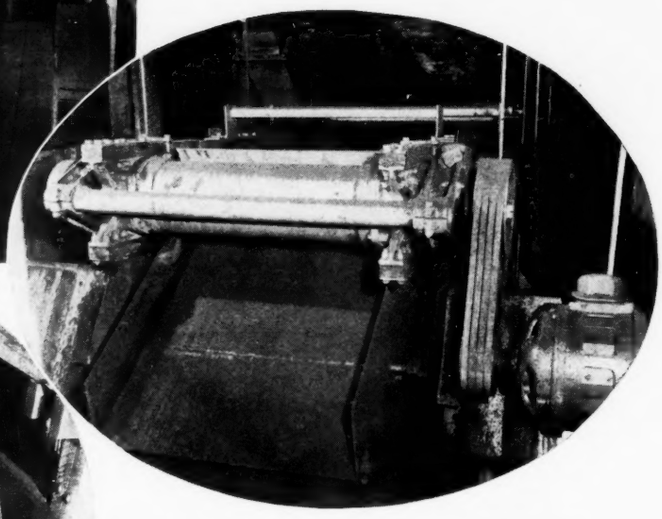
The Paradise plant, home of "Paradise" coal, also includes provisions for breaking mine-run to 6-in. when desired. Hand-picking or washer middlings down to 3-in. may be crushed to 2-in. and re-treated to recover coal values in the screenings washer, accompanied by a sludge-settling tank and conveyor to clarify the water for reuse. As low-cost timber was available on company land, the plant is wood with corrugated-sheet sides and roof. All electrical wiring is in flexible conduit and plant controls are centralized in three push button stations—a main station in the loading-boom bay and two auxiliary stations for the chloride and screenings washers. Near each motor is an emergency stop button. Falk speed reducers and Texrope V-belts predominate.

Rated capacity of the plant, designed and built by Morrow, is 250 tons per hour, although 300 has been attained at times. The washing capacity (three units) of 180 tons per hour also can be materially exceeded when desired. Although some bony material is encountered, the principal impurity in the coal is sulphur. Fireclay is another possibility, but leaving a thin coal bottom in the mine materially reduces accidental inclusion in the mine-run. On the whole, the coal is not difficult to clean mechanically.

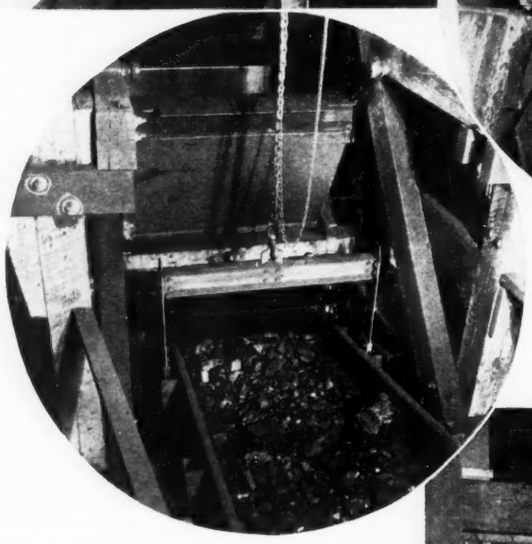
Originally, it was planned to wash only minus 2-in. at Paradise. However, consumer interest in large washed coal resulted in a decision to extend the range by adding Belknap chloride washers for egg (6x3) and stove (3x2 or 3x1¼), along with an auxiliary mixing conveyor. Equipment for treating all sizes to render them dustless is being installed.

Mine-run brought out on a slope belt (see p. 50) is discharged onto a bar screen with 1-in. openings separating out the fines as a cushion for the lumps on a 42-in. apron conveyor moving the coal down to the main

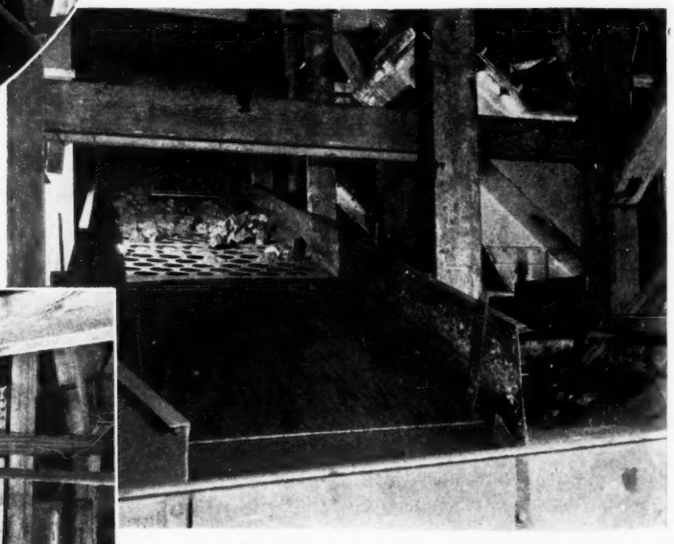
Screenings are cleaned in this multiflow wet washer and then flow to dewatering screens at the left.



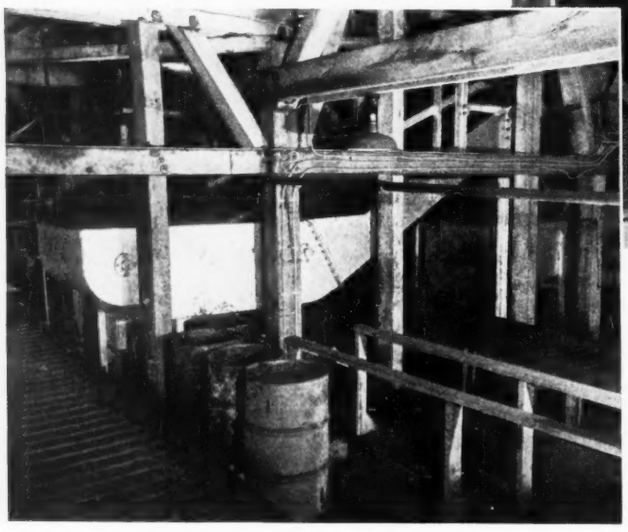
Stoker coal is prepared on this horizontal vibrator between the strands of the main distributing and mixing conveyor.



A chain block permits raising the mine-run feeding conveyor to discharge into a ring crusher ahead of the main screens.



Lower mine-run shaker at Paradise, At right is elevating conveyor to the egg chloride washer.



Two chloride washers clean egg and stove. At left is the lump picking table and loading boom.

shaker screens. This conveyor, however, is pivoted and can be raised with a chain block to discharge over a bar screen (adjustable openings) into an American Pulverizer Co. ring crusher. After reduction to the desired size, the broken lump falls directly onto the upper shaker.

The Paradise screening installation is of the Morrow unit, or self-contained, type with a scraper-type distributing and mixing conveyor accompanying the screens. Degradation goes to a refuse bin on the bottom strand of this conveyor. Flexible-wood hangers suspend the 5-ft.-wide screens, which can make all standard sizes. A 10-mesh deck on the upper shaker permits, when desired, shipment of dedusted screenings, in which case the 10-mesh dust goes to the refuse. If, however, the screenings are to be washed or rescreened, the dust is left in. Six-inch lump off the lower shaker is hand-picked on a picking table-loading boom. Pickings containing coal are crushed to 2 in. and retreated in the screenings washer. The 6x3-in. egg goes over a degradation screen into either an elevating conveyor to a chloride washer or onto a second picking table-loading boom. The same applies to 3x2- or 3x1¼-in. stove, which is loaded over a belt-type boom with a horizontal section for picking when desired.

Minus 2- or 1¼-in. screenings, with or without the 10-mesh dust, fall into the top strand of the distributing conveyor and may be passed through a gate to a belt-type boom on No. 4 track. Or they may be carried on to a 4x14-ft. Symons horizontal vibrator between the conveyor strands, to a chute to No. 5 track or to a chute to the Morrow-Prins screenings washer.

The vibrator is a two-deck unit making, when fed with 2-in. coal, 2x1¼-in. nut, 1¼x⅛-in. stoker and a ⅛-in. resultant—or other sizes by changing screens. If all three sizes are made, nut goes to an apron-type loading boom over No. 6 track, preceded by a picking section for use when desired. Stoker and resultant fall into separate compartments in the bottom strand of the distributing conveyor, the resultant going back to No. 5 track and stoker to the belt boom over No. 4 track. And by proper manipulation of gates, these sizes, either washed or dry, may be combined to make 2x⅛- or minus 2-in. (or 1¼x⅛ or minus 1¼-in. with a 1¼-in. feed), or they may be carried over to make various mixtures with the coarse sizes up to and including mine-run, which may be completely washed or hand-picked. With a mine-run feed and all screening equipment running it is possible to produce six sizes simultaneously or 28 different combinations, washing any size from 6-in. down.

This six-track plant with equipment for washing all coal from 6-in. down prepares Paradise coal for market.

Coal from 2-in. down, as indicated above, is cleaned in a Morrow-Prins "Multiflow" washer with a capacity of 100 tons per hour. Washed coal is dewatered on two flexible-wood-hanger shakers. Material through the 100 sq.ft. of wedge wire on the upper shaker (5 ft. wide) falls onto the lower, fitted with 105 sq.ft. of wedge wire to take out minus 28-mesh and water. All coal above 28-mesh is fed to the Symons screen for final separation into various stoker sizes—shipped separately or recombined as washed screenings. Minus 28-mesh and water flow to a 35-000-gal. wood settling tank, steel lined, for water recovery. Sludge is removed by a refuse conveyor. Clarified water is returned by a Weinman centrifugal.

As the two Belknap chloride washers were an addition and had to be fitted into the available space, they were especially designed with, among other things, the clean-coal elevators at one side. Rated capacity of the 6x3-in. unit, also fitted with a middlings elevator, is 50 tons per hour, while the 3x2- or 3x1¼-in. unit, without a middlings elevator, is rated at 30 tons per hour.

Middlings from the 6x3 washer are conveyed to the bony crusher, which also receives lump pickings for reduction to 2-in. and coal recovery in the Morrow-Prins washer. The chloride washers are fed by short elevating conveyors from one side of the shaker screen and are supplemented by an auxiliary distributing and mixing conveyor which can be used with the original conveyor in making combinations up to and including mine-run.

The chloride solution in the egg-coal washer is kept at 1.270; stove washer, 1.200. Concentrated calcium chloride (1.50 gravity) is purchased in insulated tank cars usually holding 6,500 gal. At the mine, the solution is diluted to about 1.35 to prevent crystallization at lower temperatures and is stored in a 12,000-gal. tank. The chloride is kept as nearly neutral as possible and is treated with an inhibiting compound to further check corrosion. Washer gravities are kept at the proper figures by regulating by means of proportioning valves the output of the clear-water rinsing sprays on the clean-coal elevators with the inflow of make-up chloride. Impellers in the bottoms of the washer tanks create a slight upward current and thus provide the necessary washing gravity.

Diluted chloride is pumped to the washers by a 150-g.p.m. Dunham centrifugal pump. Some, of course, is carried out on the coal but is not regarded as a loss, as it does an excellent job of dustproofing. Also, after passing the rinsing sprays, the solution on the clean coal has a gravity of about 1.070 to 1.100—sufficient to prevent freezing at temperatures usually encountered. In operation of the chloride units at Paradise, fine coal builds up in the solution and such concentrations are reduced by raising the solution gravity to a point where the fines come to the top and can be skimmed off. Then, the solution gravity is lowered by adding water, which offsets the drop in tank level resulting from taking out the fines. This method of eliminating fines was developed by Roy Gary, preparation foreman, and is done before the start of the shift.

WHAT'S NEW ACROSS THE SEA

FOR some reason, many British mine owners believe that they cannot use water on the cutter bar with advantage and safety because it makes the mine floor heave. Why water should do so much more damage in Great Britain than in the United States is not clear. Perhaps it is because British mines are deeper than ours, and weaknesses in the floor that, in British mines, would be disastrous may be relatively harmless in our shallower workings. Then again, our mines possibly are so shallow that, for generations prior to mining, water has had an opportunity to enter and leave the coal measures in some degree, however greatly restricted. It is, therefore, not altogether a new and unwelcome visitor, even if it then comes, as a result of mining, in somewhat greater quantity.

When, in Great Britain, as the outcome of mining, spraying and even flooding, water is admitted for the first time since the age of deposition of the coal measures involved, the floor may soften and expand far more than it would (1) if its soluble parts had been dissolved and possibly leached out in the course of centuries; (2) if the chemical actions that water will cause already had occurred and (3) if the expansions that accompany wetting, hydration and crystallization previously had been accomplished wholly or in part. One recalls the failure of the St. Francis dam of the Los Angeles Aqueduct, March 13, 1928. It had been placed on a solid rock formation that for generations had not been subjected to the action of water. After the reservoir filled, the rock became soft and yielding, and the dam was washed down the river.

England has a lot of such formations, though they are not so often found in Carboniferous measures as in those below and above them. Fullers earth appears in almost all geological ages in England, but the writer has not been able to find record of its presence in the coal measures of that country.

Possibility of trouble from hydration or wetting is well illustrated by the experience of lignite mines near Edmonton, Alberta, Canada, a somewhat dry area. Here, a 4-in. parting in the coal, 18 in. from the roof, and the roof itself contain a claylike substance known as Bentonite which, when it is wetted, will become quite soft and will expand, it is said, until it occupies more than a dozen times its original volumetric dimensions. Where this Bentonite occurs, the coal is removed up to the Bentonite. This is then stripped from under the upper bench. The latter is left in place to protect the roof from moisture, which otherwise would cause an expansion of the Bentonite that could not be resisted.

British mines quite usually are far drier than those in the United States. As they are warm, even atmospheric moisture usually is in low percentage. Accordingly, they are relatively dusty. Hence, the coal dust created by mining, instead of all going out in the cars, as it does when the cutter bar is drenched with water and coal piles are wetted down, is spread in a cloud all over the mine, so that an immense quantity of immunizing rock dust is needed. At collieries of one company, declares the inspector of the North Western Division in his annual report for 1938, the cost of inert-dust treatment was over $92,000 in 1937, equivalent to 2.86c. per short ton of coal hoisted.

One method to reduce the quantity of powdered coal that makes necessary the use of so much inert dust is to remove the bug dust or "gum" by a mechanical device attached to the cutting machine. This engages the material from the cut as completely as possible as soon as the cutter chain brings it out and does not let it be carried back into the cut for further comminution.

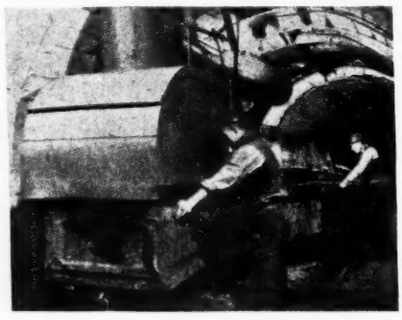


Fig. 1—Dust catcher over discharge of gate conveyor.

Fig. 2—Cowl covers turret cutter and thus prevents formation of dust clouds.

These "gummers" may merely move the coal away from the action of the bits or may lift it onto a face conveyor, replacing the flight through the air, incident to shoveling, by a relatively gentle sliding on a metal surface. Another source of dust is the use of explosives, so the "hydraulic burster" is being used to dislodge the coal, thus displacing the violence of an explosion by a gentle but firm push and reducing the quantity of fine coal and dust. But one of the prime sources of dusty air are the discharge ends of the conveyors where coal drops into cars, or "tubs," and here suction devices are used to gather the dust, sprays to settle it, and settling devices and spaces to collect it.

To dilute 100 lb. of coal dust, 100 lb. of inert dust is needed if a 50-per-cent dilution of the combustible is desired, but to dilute 100 lb. of dust so that only 25 per cent is combustible requires not twice but three times as much, or 300 lb., as the inspector of the North Western District indicates. No one has completely solved the problem of preventing the distribution of coal dust in mining, he adds, and no one has "even propounded a feasible method of dealing with dust raised by shoveling on conveyors."

He does not even suggest the American way of using water on the cutter bar and on ribs, face and fallen coal. Probably, with British conditions what they are, he would question its feasibility.

At Norton colliery, North Staffordshire, a dust collector at a loading point removed ½ to ¾ lb. of dust per ton of output, thus saving the application of 1,120 lb. of rock dust per shift, which, based on cost of rock dust, wages for distribution and recleaning, would save $2,187 a year. Another colliery, by fitting a dust extractor to the loading head of a gate conveyor handling 448 tons of coal each shift, removed 70 lb. of coal dust in the same period, 90 per cent of which could pass through a 200-mesh screen, thereby reducing the cost of rock-dust treatment 38 per cent and making an annual saving of $1,458. The capital cost of the coal-dust extractor was less than $243, but, in estimating the saving, running costs should be considered. Despite this deduction, however, it was a highly profitable installation as well as an asset to safety and comfort.

Much success, the inspector adds, has been attained at Chanters colliery, Lancashire, by merely stretching brattice cloth over the conveyors, and at Whitfield colliery, North Staffordshire, by reducing the speed of the belts. Gate-end loading employees, who formerly wore respirators, have discarded them. To the water for compressed-air sprays the inspector would add a little Perminal, a chemical that enables the water to disperse more readily over the surface of the dust, for coal dust does not take kindly to water. Steam, if available, he says, would be better than a water mist, because steam wets coal dust easily.

Mist projectors can be, and are, used to create a barrier at the entrance of a return airway to entrap the dust coming from the face. Two, three or four mist

projectors disposed around the periphery of the airway can completely blanket the entire cross section and wet all the dust in the air. The inspector would like to add an expansion chamber where the dust might settle. He does not say how the moisture from the sprays affects the mine floor.

Pickhammers also are in use. The inspector puts them in an entirely different class from percussive drills, which in making a 4-ft. hole may produce as much as 3½ lb. of dust so fine that it will pass through a 60-mesh screen. In a conveyor face, 50 holes, he says convincingly, would produce nearly 168 lb. of dust, a quantity that is well worth eliminating. Rotary drills with eccentric, or "wobble," bits produce so little dust that they are on the same list as the approved dust traps used for the prevention of silicosis.

To keep coal dust from being flung into the air by the fast-traveling bits of a turret machine, cutting at the roof, the management of the Victoria colliery, North Staffordshire, surrounded its rear and sides with three lengths of a wide rubber belt, the top one of which is arranged to scrape the roof and to fit any unevenness in its contours. The bottom section is fitted less tightly but is made dust-tight by the falling coal which forms a pile around the juncture of the lower belt with the mine floor. Without this shroud, or cowl, a light could not be seen at 24 yd. on the return side, but with the cowl, a similar light could be seen 40 or 50 yd. away.

A totally inclosed tank holding 16 gal. of water has been provided on every cutting machine by the Shelton Deep colliery, North Staffordshire, with an inlet pipe for compressed air and an outlet pipe for water and 20 ft. of rubber hose. It is not to be used for wet cutting but to extinguish fires started by the cutter bits when hard material is encountered. A jet of water of 27 ft. effective radius can be forced from the nozzle for a period of 2½ minutes at the rate of 6 gal. per minute. Thus, with the aid of the 20 ft. of hose, it can deliver water 47 ft. from the machine.

Use of dry ice (solid carbon dioxide), known as Drikold, has been tested by Messrs. Manchester Collieries, Ltd., as a means of inhibiting the ignition of gas at the back of the cut by the bits of a chain cutter where hard material is encountered, but resumption of tests awaits further experiments being made by the Safety in Mines Research Station at Buxton.

R. Dawson Hall

WHAT'S NEW ON THE BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.

Classification Chart of Typical Coals of the United States, by A. C. Fieldner, W. A. Selvig and W. H. Frederic, U. S. Bureau of Mines. R. I. 3296R; 22 pp.; mimeograph.

The reviewer looked through the report for a definition of the word "typical," but found none. However, a "footnote" states that the aforesaid classification fails to cover a few coals which, having fixed carbon and B.t.u. such as would place them in the high-volatile bituminous or sub-bituminous ranks, are so unusual physically and in chemical properties as to make it desirable to exclude them from this classification. These doubtless include cannels, but, in making a classification of some coals and not others, it seems right to specify just which of them have been shown by present studies to be atypical and, therefore, suited for exclusion.

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Analyses of Pennsylvania Bituminous Coals, U. S. Bureau of Mines, T.P. 590. 503 pp.; paper. Price, 50c.

Ninety pages of analyses of coal as shipped or delivered are to be found in this technical publication, showing what can be expected of a long list of Pennsylvania mines with the cleaning facilities available. Of analyses of mine samples there are 104 pages followed by details of the coals sampled at the several mines and the point of sampling in each. Ash-softening temperatures appear in most cases and agglomerating indexes where the analysis was made after Nov. 5, 1934; but nearly all the coals are agglomerating. General information is given on the coal geology of the State, the methods by which its coal is mined and prepared, the quantities produced and distributed, and the uses to which the coal is put.

•

Classification and Tabling of Table Middlings at the Colta Coal Washery, Flat Creek, Ala., by B. W. Gandrud, G. D. Coe and H. J. Harger, U. S. Bureau of Mines. R. I. 3448; 22 pp.; mimeograph.

At the Colta washery, run-of-mine coal is crushed in a hammer mill in closed circuit with ⅜-in. square-mesh vibrating screens and tabled without sizing on eight rectangular-deck wet tables. The coal usually breaks more readily than the bone, so the bony coal is large and the clean coal is fine. An unsized feed of this kind will not be cleaned on a concentrating table with high efficiency because, if the table is to exclude the coarse bone from the clean coal, much of the fine coal will be lost in the middlings, and if there is no market for the middlings, much coal must be discarded with the refuse. Re-treatment of tailings, in the plant, actually saved 1.60 tons per hour and, in the laboratory, the equivalent of 2.18 tons.

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Carbonizing Properties and Petrographic Composition of Washed and Unwashed Lower and Upper Kittanning Bed Coal From Mines 72 and 73, Johnstown, Cambria County, Pa., by A. C. Fieldner and others, U. S. Bureau of Mines. T.P. 595; 81 pp.; paper. Price, 10c.

This study adheres to the lines followed in Bureau of Mines reports on other coking coals. Strange to say, in the slot oven, the Lower Kittanning unwashed coal expanded linearly 47.1 per cent of charge thickness and the Lower Kittanning washed coal expanded only 28.8 per cent. In the sole-heated oven the expansions were similar—40.8 and 27.0 respectively. Did washing thus decrease the expansivity of the coal? With the Upper Kittanning, washing seemed to make little difference.

The authors declare that the washed coal may have an origin within the mines different from that of the unwashed, and that analyses of samples of the Lower Kittanning coal in these mines from place to place differ considerably. The moisture in the washed coal is about 1 per cent higher than in the unwashed, and excess moisture, they add, reduces expansion, but this small excess, the authors believe, would not account for the difference in behavior during coking. They say nothing, however, as to what the producer does to the coal in the process of getting the moisture of the washed product down almost to that of the unwashed, a fact that might or might not be of interest.

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Expansion of Coal During Coking, by H. S. Auvil, J. D. Davis and J. T. McCartney, U. S. Bureau of Mines, R. I. 3451; 21 pp.; mimeograph.

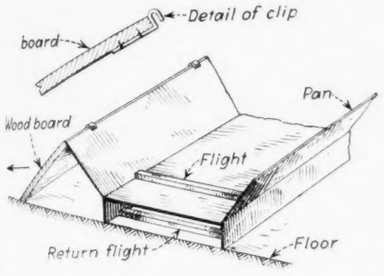
In this report, tests are recorded made with slot and with sole test ovens to ascertain how much and at what temperatures coal expands during coking. Results, the authors found, would not change significantly if the apparatus were enlarged to full oven scale, as results are in substantial agreement in the two types of ovens when carbonizing conditions are comparable. Verticality, as in the slot oven, or horizontality, as in the sole oven, of the plastic layer does not influence the extent of coal expansion, so long as the gas is allowed to follow its normal paths in escaping from the charge.

After coal is put into the oven it may shrink and, though it has formed bridges between the walls, those bridges will be broken and the coal will slump or "squat," and then when new bridges are formed by expansion and coking, the coke will be unable to expand up into the free space. Dense coke then will be formed under pressure so severe that it will tend to push over the oven walls.

WHAT'S NEW IN OPERATING IDEAS

Face-Conveyor Sideboards Raise Efficiency

Boards clipped to the front of a face conveyor permit such a conveyor to be moved closer to the coal face before shooting without danger of damage to the conveyor, while at the same time a definite advantage in loading is gained, declares E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky. Moving the conveyor up close, says Mr. Smith, means that it is possible to fill the pans when the coal is shot down, provided the boards are properly sloped and clipped into place. Also, the wood protects the conveyor and provides a sloping surface up which the coal may be raked into the pans. Raking, Mr. Smith states, permits loading a larger volume with the same expenditure of energy.



Showing how boards may be clipped to the front of a face conveyor for easier loading and greater protection.

Boards also keep coal from getting under the pans and fouling the return chain, thus eliminating much of the delay chargeable to cleaning or repairing breaks, not to mention reducing the load on the driving motor and thus saving power.

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Formula Permits Estimating Length of Rope on Drum

Pointing out that the length of a hose, rope, cable, etc., wound on a reel frequently is desired, Paul C. Ziemke, Milwaukee, Wis., offers the following method of securing a satisfactory estimate. The rope or cable assumes a position such as is shown diagrammatically in the accompanying sketch, with the wraps on the second and succeeding layers lying in the valleys formed by the first. Thus the maximum length is wound on the drum, especially if the rope or cable is tight.

To determine the number of feet on a drum, four measurements are necessary, as follows:

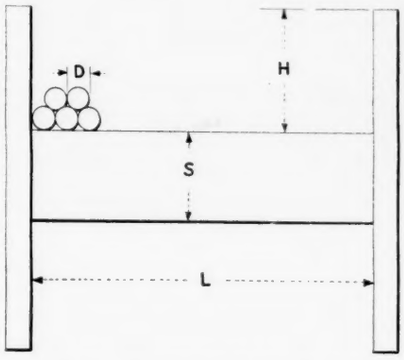
H, or the depth of the material on the drum in inches;

S, the diameter of the drum, in inches;

L, the length of the drum, in inches, and

D, the diameter of the material in inches.

To the depth, *H*, of the rope or cable add *S*, the diameter of the drum cylinder. Then multiply by *H*, in inches. Then multiply by the inside length of the drum in inches, *L*



Showing the dimensions used in the formula.

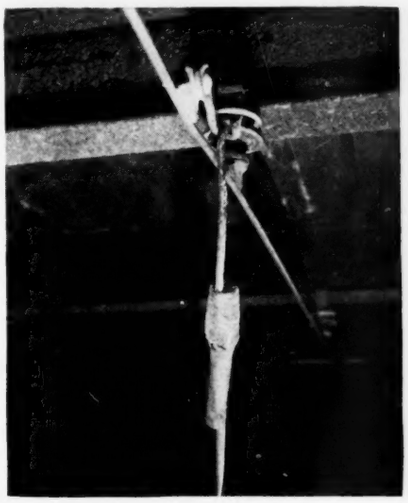
in the sketch. Then divide by the square of the diameter of the rope in inches. Then multiply by 0.3, which gives the length in feet. While 100-per-cent-correct figures are not obtainable in this manner, the formula will give a fair approximation of the footage wound on the reel or drum, says Mr. Ziemke.

•

Forged Hook Bolted to Clamp Accommodates Ball Nip

Greater strength than one might estimate is required at the clamp where a locomotive trailing cable is nipped to the trolley wire. After difficulties during the first trials of a clamp adapted to use with a safety-type ball-end nip, mechanics at Mine No. 20 of the Island Creek Coal Co., Holden, W. Va., developed the hook shown in the illustration. Experience to date indicates that it has sufficient strength to stand the service.

The mine blacksmith forges this hook from a piece of ½-in. round iron and it is attached to a Dukane trolley-wire clamp by the transverse bolt which pulls the jaws together. Under the tape covering the wooden handle of the nip is a fuse. The base of the nip rod and the trailing-cable



One-half-inch hook applied to a bolted clamp serves a ball-end nip.

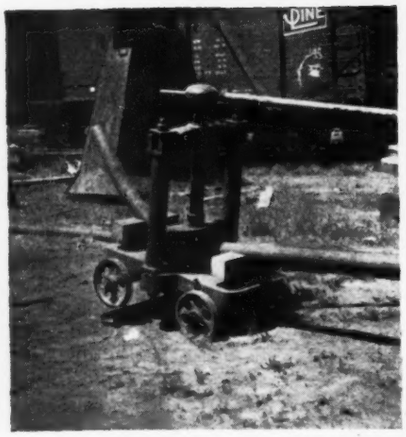
terminal are bolted to the wood at points a few inches apart and the fuse is connected across. Sufficient tape covers the fuse so that if it blows it will not burn through. The chance, however, of a fuse blowing when a man is holding the handle is extremely slight because safety demands that the load be off during the act of connecting and disconnecting the nip.

•

Boiler Tubes Formed to Shape By Portable Bending Unit

Forming of boiler tubes is facilitated by the portable bending unit shown in the accompanying illustration, which K. N. Banthin, Oak Park, Ill., states was developed to meet the needs of a small mining company which purchased a lot of new tubes from an industrial plant which was quitting business. When retubing was started at the mine, inspection of the back rows showed that there was a surplus of some types of tubes and a shortage of others, which led to a decision to alter the new longer tubes and bend them to fit.

The bender developed for the purpose was made from materials available either at the mine or locally. The baseplate was the bottom plate of a counterweight originally used on a car unloader. The screw and top header originally were used on a filter press and were bought as scrap from a near-by brewery. The uprights are 3-in. extra-heavy pipe and are tied together with



Bender set up and in use.

1¼-in. bolts. The blocking is hard oak which was cut to the desired shape in the mine carpenter shop. The wheels were a later addition designed to facilitate moving the unit when others in the locality borrowed it for rush jobs. Construction cost was returned on the first job on which the unit was used.

•

Reclaiming Locomotive Tires By Flame Cutting

Although locomotive tires are quite hard, wearing action on the rail and by a brake shoe often is sufficient to cut ½ to ¾ in. of steel off them in less than three months. *Oxy-Acetylene Tips* describes the reconditioning of worn tires by the use of an Oxweld portable cutting machine, Type CM-16, equipped with a heavy-cutting attachment. The truck is removed from the locomotive and set on end, it being unnecessary to remove the wheel. A riding surface for the machine is provided by cutting from ½-in. plate a circle approximately 1 in. larger in diameter than the inside diameter of the tire. A ⅝-in. hole is drilled in the center so that the radius-bar center point of the machine can extend through the plate and into the center hole of the axle. If the axle hole is larger than ⅝ in. it can be filled with lead and redrilled. When an axle protrudes beyond the wheel it is necessary to cut the riding plate to slip over the axle and construct a special offset radius rod for the machine.

Two methods of shaping the worn wheels

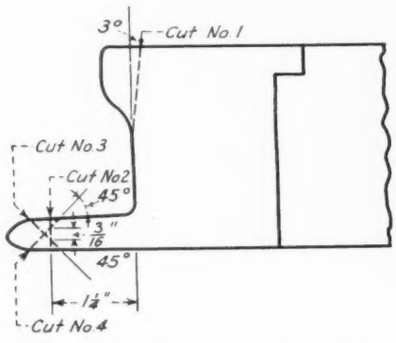


Fig. 1—Reclaiming locomotive tires by making four cuts.

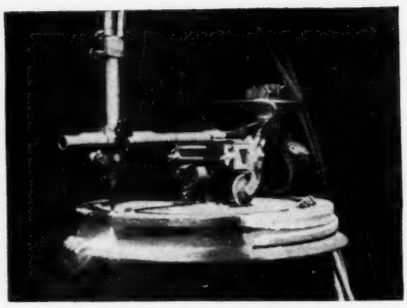


Fig. 2—First the false flange is removed (Cut No. 1, Fig. 1).

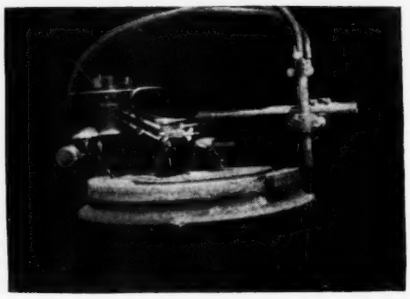


Fig. 3—A vertical cut (No. 2) is made in the true flange.

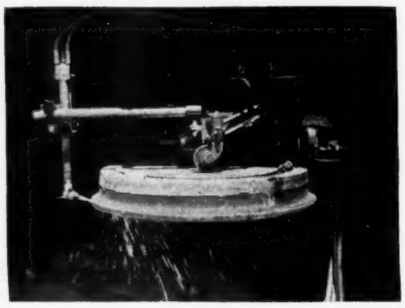


Fig. 4—A bevel-cutting adapter is necessary for cutting bottom bevel of flange (No. 3).

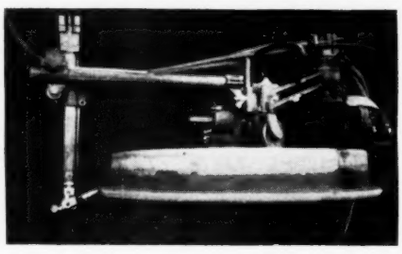


Fig. 5—The top bevel of the flange (Cut No. 4) completes the sequence of the machine-cutting operations.

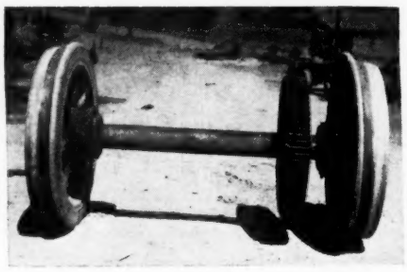


Fig. 6—These tires have been reclaimed by machine cutting at approximately half the cost of other methods.

Over the Dam

Some folks say that when something is over and done with you should just forget it. But that is not necessarily true, as checking back over how a thing happened and what was done to take care of it is the best way in the world to prevent a repetition or to develop a better method of taking care of it if it does occur again. Operating, electrical, mechanical and safety men around the mines everywhere have had this experience. So send in your solution of any unexpected problems you have encountered, along with a sketch or photo if it will help to make it clearer. For each acceptable idea, Coal Age pays $5 or more on publication.

have been developed. The first involves four cuts (Figs. 1 to 5) made in the sequence indicated in Fig. 1 because checking is most likely to occur in Cuts 3 and 4 and this tendency is reduced by the heat added to the metal in making Cuts 1 and 2. The extra heat also makes it possible to carry Cut 4 at a faster rate and with lower oxygen pressure than otherwise would be the case, thereby decreasing the possibility of scarring the tread with exhaust gases or slag. Accidental nicks are built up by welding and no other finishing touches are necessary. Sharp corners or small blemishes soon are removed by the hardened brake shoe.

The second method necessitates three

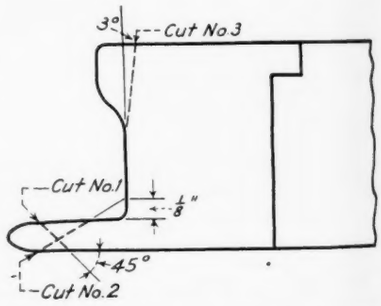


Fig. 7—Reclaiming tires by making three cuts with preheating and postheating

separate cuts (Fig. 7) and requires preheating and postheating. The heating apparatus consists of a seven-flame head attached to a welding blowpipe mounted on the horizontal tube which carries the cutting blowpipe. For preheating, the tire is rotated at about 20 in. per minute until the metal is hot enough to melt solder (about 650 deg. F.). Cut 1 is made at a speed of about 12 in. per minute with an oxygen pressure of 20 lb. per square inch. With the seven-flame head mounted for postheating, Cut 2 is made at about 12 in. per minute and 25 lb. per square inch oxygen pressure. The postheating head follows the cutting blowpipe at a distance of 6 to 8 in. with its flames directed at the base of the flange. This cut should produce a taper which if extended would intercept the tread

approximately ⅜ in. from the junction of tread and flange. Without further heating, Cut 3 is made at a speed of 12 to 14 in. per minute and an oxygen pressure of 25 lb. per square inch.

•

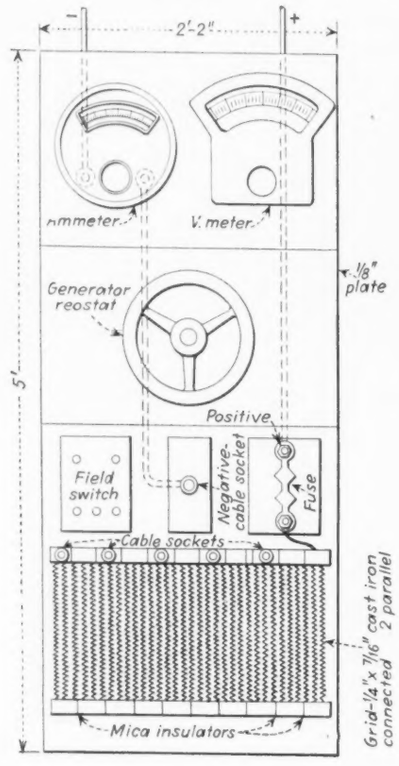
Arc Welder Made at Mine From Material on Hand

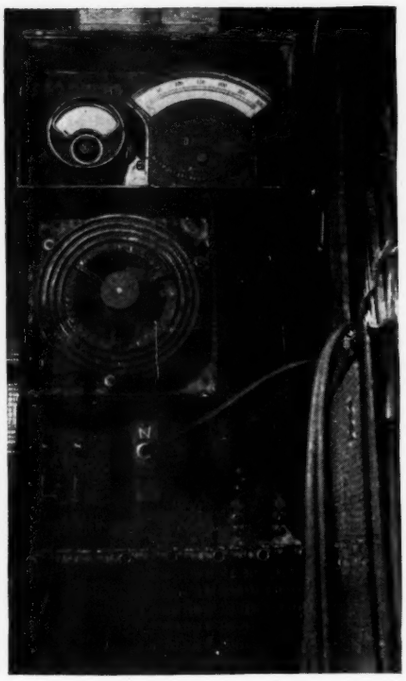
Needing an arc welder, writes C. A. McDowell, master mechanic, Luscar Coals, Ltd., Luscar, Alberta, Canada, a census was made of material on hand at the mine to see if equipment was available for constructing one. This census uncovered an old Triumph Electric 220-volt 70-kw. 318-amp. 850-r.p.m. d.c. generator, compound-wound, with ammeter, voltmeter and field rheostat; a 35-hp. induction motor; and a stack of cast-iron grids from an old 50-hp. series-wound d.c. hoisting motor. The motor was belted to the generator to run it at 550 r.p.m., which, it will be noted, is below the rated speed, thus reducing the voltage. Even at that, Mr. McDowell points out, commutation is good.

The rheostat provided a range of 25 to 100 volts with the field connected two-parallel and separately excited with 110 volts. Cross-sectional area of the grids was 140,000 circ.mils and connecting them two-parallel provided a circuit cross section of 280,000 circ.mils. With each grid having a length of 4½ ft., connecting 40 of these grids two-parallel provided a circuit length of 90 ft. Using 700 as the resistance per mil-foot at ordinary temperatures, circuit resistance was 0.225 ohm, making the current to ground (25 divided by 0.225) 107 amp.

The resistance was divided into five equal sections, each with a cable socket to furnish five current strengths, in addition to the variation made possible by the field rheostat. The series field of the generator is cumulatively connected and the machine may be used self-excited if desired. "We get very good results with shielded electrodes varying in size from ⅛ to $\frac{5}{16}$ in. With bare electrodes," says Mr. McDowell, "we get fair results, but an induction coil in the circuit is desirable." Generator and driving motor are in another building 75 ft. away from the shop end of the apparatus, which is shown in the accompanying illustrations.

Diagrammatic sketch of the shop end of the arc welder.



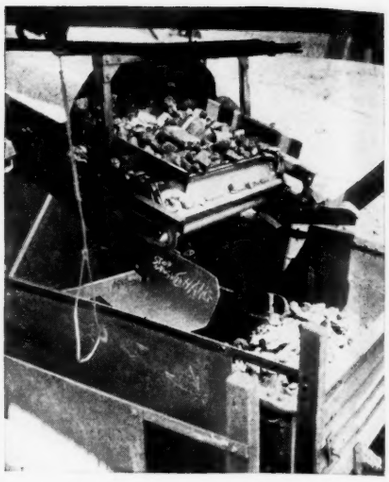


Showing the cable sockets in the resistor grids.

•

Car Trimming Facilitated By Guides on Booms

To keep lump and other sizes from rolling off cars while they are being loaded, a number of companies in northern West Virginia have installed skirt plates, or guides, on the ends of loading booms. The accompanying illustration shows the type of guide members used on the booms at Dawson No. 2 mine, Dawson Coal Co., Clarksburg, W. Va. As can be seen, these guide members stop a lump from rolling until the car trimmer can place it or it settles into permanent position of its own accord. Various types of guide members are used at other plants, but the principle of operation is substantially the same.



Guide members on each side of this lump boom keep chunks from rolling and thus facilitate car trimming.

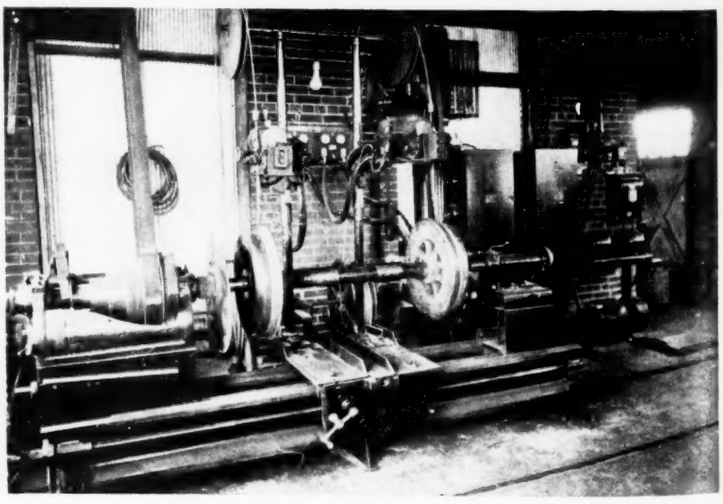
•

Mine-Locomotive Tires Rebuilt by Welding

Mine 43 of the Peabody Coal Co., in Illinois, has welded up 1,376 worn mine-locomotive tires with a breakage of only eleven units. And since the development of improved welding practices there has been no breakage whatever, due to the development of a method which apparently eliminates the uncertainty of results.

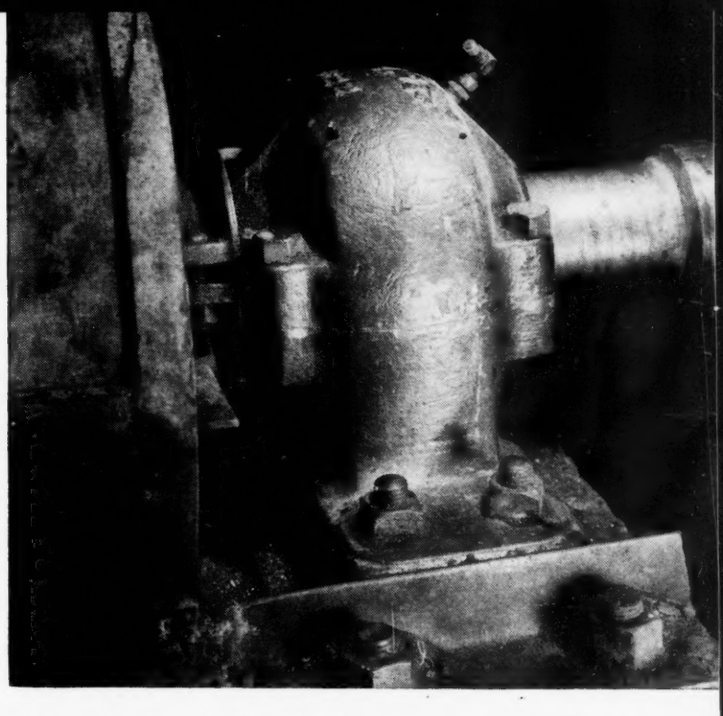
Several elements figure in the successful process. First, the worn-out tire is preheated. Then, during welding, a continuous motor-

Peabody tire-welding unit.



TIME AFTER TIME SUPERLA GREASE SOLVES OPERATORS' PROBLEMS

One time it may be a stripping shovel, another time a blower bearing—or a conveyor, but in practically every case when the Standard Lubrication Engineer looks into the problem, he finds that the right grade of Superla grease is the answer.

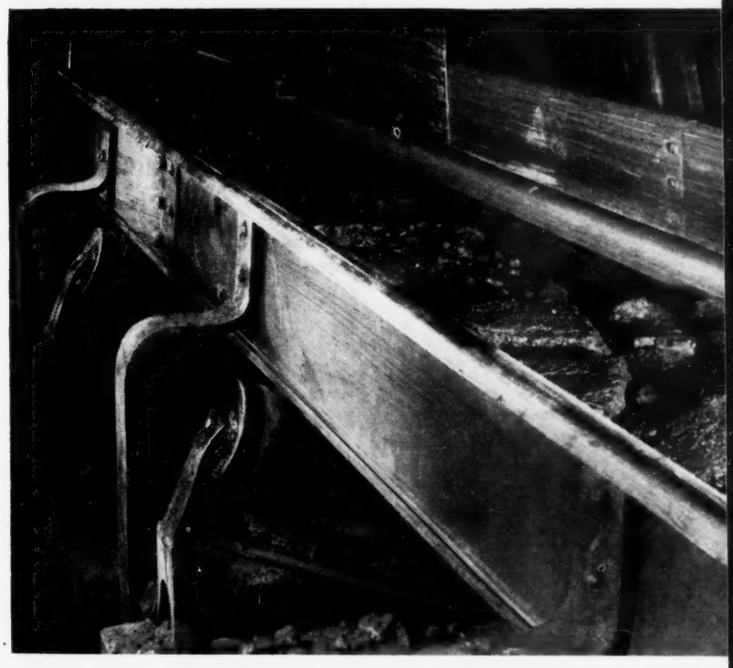


A large stripping shovel had a 100-ton counterweight to balance the boom and shovel load. The weight effectively reduced power load, but brought a difficult lubricating problem. Temperatures in the plain bearings on the counterweight cable shaft ran very high. It was necessary to shut down periodically to allow them to cool.

Down time on this shovel cost money. Something had to be done. Various lubricants were tested, among them Superla Grease, suggested by a Standard Lubrication Engineer. That ended the trouble, and eliminated costly time losses.

At another central state mine, blower-motor bearings burned out so often a spare motor had to be kept ready at all times.

A Standard Lubrication Engineer was given permission to test Superla Grease on one of these motors. The bearings were thoroughly cleaned and Superla 2X put in. And again a hot bearing problem was solved.



Roll bearings on belt conveyors shipped by a large midwestern manufacturer are all protected with Superla Grease. But only after fact-finding study and competitive tests was Superla given this responsibility.

Let a Standard Lubrication Engineer work on your grease lubricating problems. Superla may be the answer. Just call your local Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois.

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING *THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS*

operated peening hammer is directed on the new bead while the wheel is slowly cooling in a heat-insulated case. Among the equipment used are General Electric arc-welding sets together with automatic heads, cables, reels, torch, peening unit, and geared-down welding lathe. Since in most cases the deposited material is softer than the original tire, the repaired unit actually has more traction than it had when new. This, however, is dependent upon the type of electrode used. A hard surface may be put on if that seems preferable.

Officials of the Peabody Coal Co. have expressed satisfaction with the method. Since many varying factors are involved in determining the cost of such a repair job under different conditions, it is difficult to determine the exact expense per wheel. The figure of $11 per tire, however, has been given as the over-all cost for such a job.

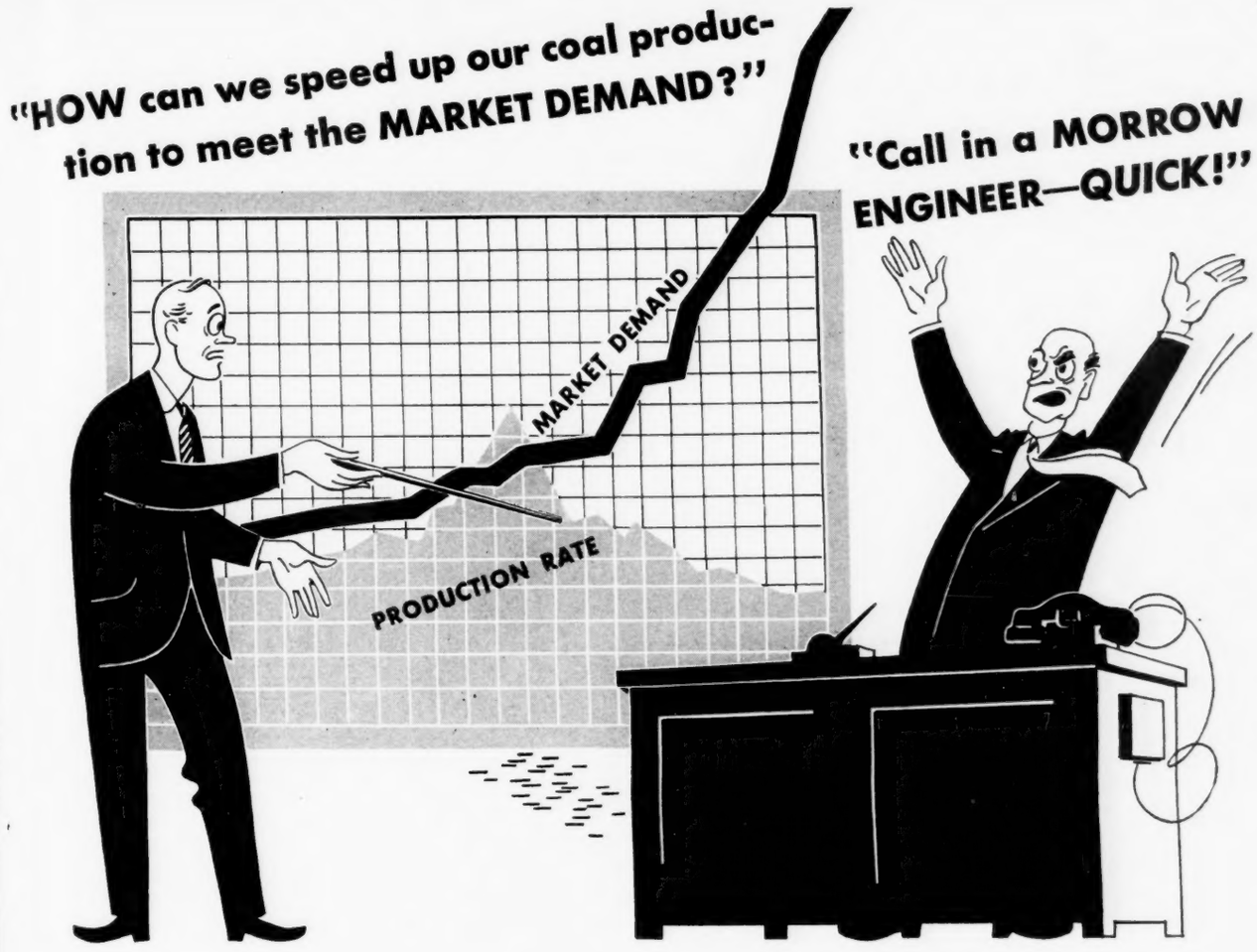
•

Sand-Handling Labor Cut By Sand-House Design

In planning the construction of the sand house at the new Robinson Run No. 2 mine of the Christopher Mining Co., Maidsville, W. Va., advantage was taken of a hillside to reduce sand-handling labor.

Dried sand on tap direct from the dryer.

Lift from the bin to the dryer is short.



MORROW is helping numerous Progressive Coal Operators to solve their 1940 Production Problems

Many operators who are faced with the immediate problem of increasing production without disturbing their present activity are finding the Morrow organization ready and able to cooperate with everything from a simple replacement to a complete coal tipple installation.

Modern, more efficient shaking and vibrating screens, picking tables, hoppers, conveyors, rotary dumps, chutes, loading booms, crushers, dryers, recirculators and washers, are just a few of the many important replacements that Morrow has furnished to alert operators during the past few months. Morrow's complete design and manufacturing facilities are always at your service, too.

May we cooperate with you?

MORROW

MANUFACTURING CO. WELLSTON, OHIO

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

Trucks dump into a bin in which the sand is at a convenient level for shoveling into the Perfection No. 6 sand dryer. From this dryer the sand flows by gravity into a concrete storage bin, the bottom of which is high enough so that a gate and spout on the outside close to the track are at a convenient level. The motormen use buckets in filling the locomotive sand boxes.

Robinson Run No. 2 ships 5,500 tons of coal a day and main haulage is handled by two 15-ton locomotives. One-way distance is two miles and the average and maximum grades against the loads are 2 and 2½ per cent. Other locomotive equipment consists of one 15-ton relay unit and seven 8-ton cable-reel locomotives which service that number of loading machines.

•

Motor Ramp Obviates Much Excavation In Rebuilding Bottom

IN A NEW bottom layout designed to facilitate handling and dumping four types of cars at No. 1 mine of the Island Creek Coal Co., Holden, W. Va., the use of a ramp in the motor run-around saved considerable excavation as compared to grading both the run-around and load tracks to the same levels. A trip feeder used in the original layout was moved farther back from the cross-over dump and a car haul was installed between.

A recent step in the steady campaign to concentrate and consolidate operations which began in 1923 was the compelling reason for the No. 1 bottom improvements. A modern 500-t.p.h. combination wet and dry preparation plant was completed not long ago at No. 1 mine and the plan was to use this plant on the second shift for preparing and loading the output of No. 21 mine. The latter is an adjacent operation from the workings of which there would be no difficulty in cutting through to No. 1 and hauling the output to the slope bottom.

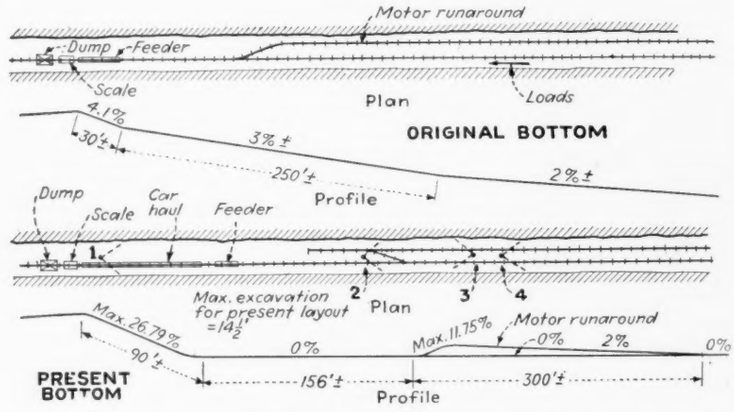
In that case the loading at No. 21 mine would be done on the second shift of the day after the No. 1 mine loading shift was over. At both mines additional cars had been purchased and in both cases they were of larger capacity and were longer over-all or had a longer wheelbase than the first purchases. Thus it would be necessary to handle four types of cars on No. 1 bottom, which was impossible with the existing grades and trip-feeder arrangement.

At No. 1 mine the coal is 35 ft. below tipple track level and the opening is an 18-deg. slope 87 ft. long. From a 10-ton hopper under a cross-over dump the coal is carried up to the tipple on a 48-in. belt 285 ft. long center-to-center.

The original bottom arrangement (top half of the accompanying drawing) consisted of a trip feeder on a 4-per-cent grade, which feeder pulled from a 3-per-cent grade extending back 250 ft. Back of that the load track was on 2-per-cent grade, also against the loads. On such grades the feeder dogs must engage the cars with certainty and exactness; otherwise the trip will start back and cause excessive shock to the equipment when reengagement takes place. No practicable method of arranging the feeder to accomplish the exact engagement of cars without backlash could be found. All of the cars have steel bodies and the larger types carry 5 tons of coal.

For the new arrangement the track scale and dump were not disturbed. Referring to the lower half of the drawing, the mine bottom was excavated to drop the load track to level grade for a distance of 456 ft. terminating at a rise 90 ft. long adjacent to the dump and having a maximum grade of 26.79 per cent near the top.

Where the rise begins, the load track is 9 ft. lower than originally and the maximum excavation to accommodate the trip-feeder equipment was 14½ ft. The motor run-around track was lowered to the same grade as the load track only for a sufficient distance to accommodate the switch and a ramp on an 11.75-per-cent maximum grade leading back to the original level.

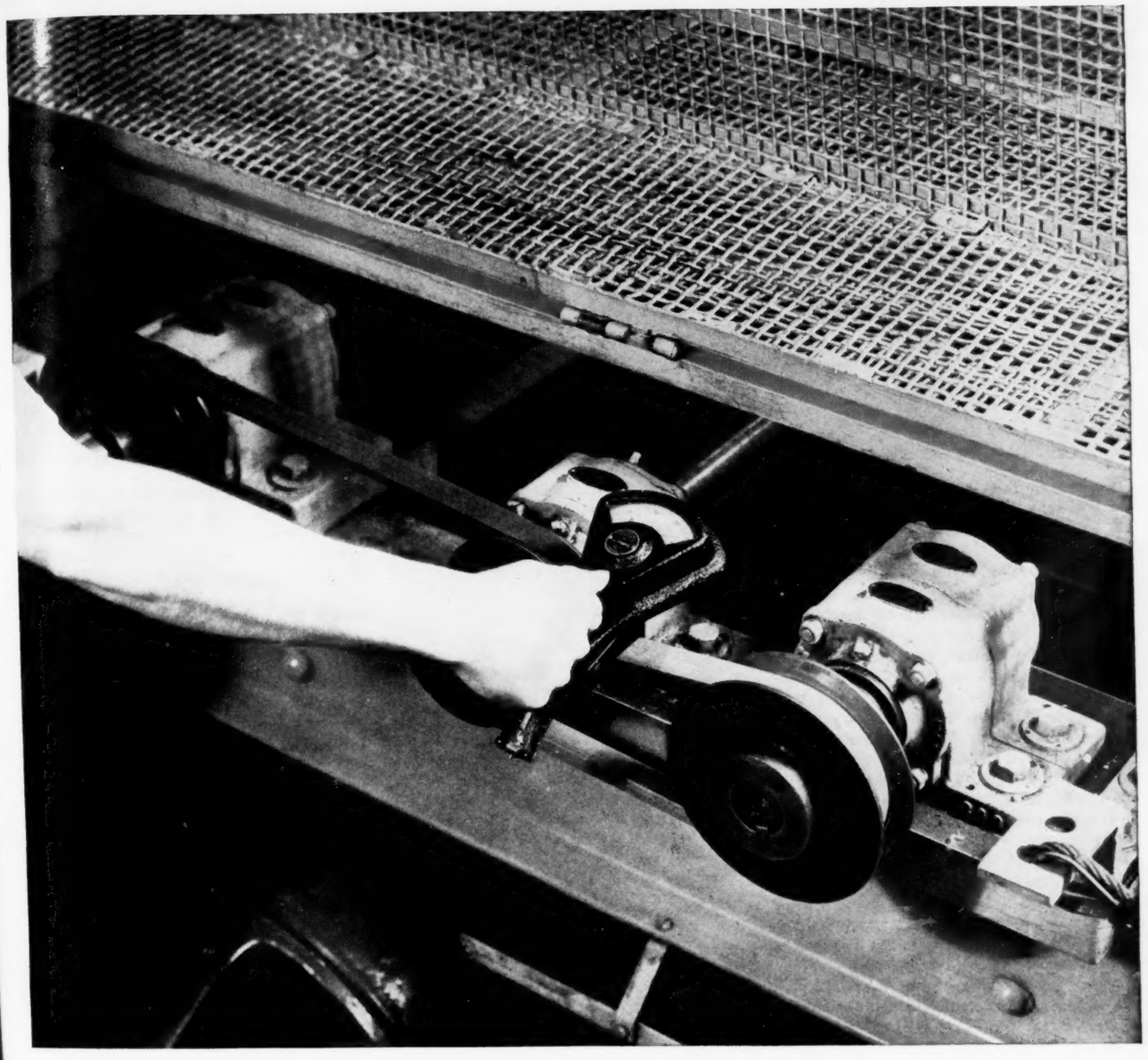


The original bottom was changed from a 3-per-cent grade to level, the trip feeder moved and a car haul installed. Numerals and broken lines indicate camera positions when photographs of the new bottom were made.

The run-around track ends at a concrete wall at the limit of the excavation for that track. Outby of the switch and terminating at the wall the motorman has a space of two locomotive lengths to get a start for

At the point between the car haul in the foreground and the trip feeder showing under the car, the track was lowered 9 ft. This photograph was made from Position 1 of the drawing.

This view from Position 2 looks inby at the ramp by which locomotives return to the higher level, left undisturbed to save excavation in the reconstruction of the bottom.



His thermometer says fever has passed, the patient will live—longer

A typical example of Goodrich improvement in rubber

HE'S "taking the temperature" of a V-Belt — the rubber-and-fabric belt that drives thousands of America's machines. But when a short belt like this whirls around its pulleys, terrific heat is generated. Internal heat destroys belts, and V-belts were breaking down, causing stoppage of machinery, costing too much to maintain.

Goodrich engineers went to work on this "belt fever." They made up new compound after compound of rubber, made each into a belt, ran it until it wore out, taking its temperature as carefully as though it were a hospital fever patient in a crisis.

Finally a compound was discovered that did carry off the heat as developed, and so did run cooler. After scores more experiments this was perfected — it operates 75% cooler than old rubber compounds. At once this new development was used in all Goodrich V-Belts — and immediately belt costs went down in thousands of plants, production shut-downs were reduced, new records for belt life began to be made.

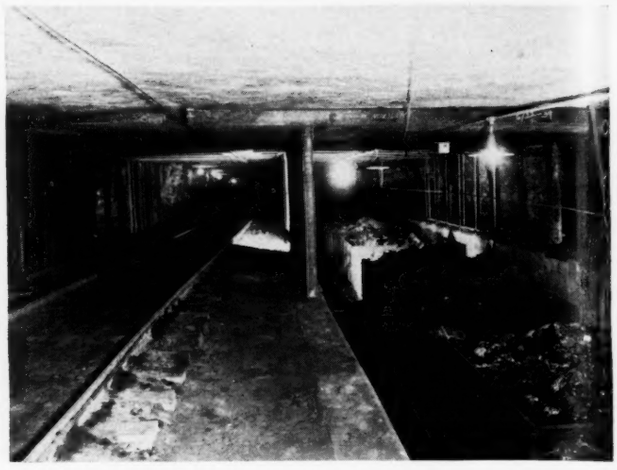
This sort of research goes on constantly at Goodrich—125 engineers are engaged exclusively in making every Goodrich product better, longer lived, less expensive for you to use. To be certain you are getting all the benefits of this great program of improvement, you have only to specify *Goodrich* to your Distributor. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

(Another story of Goodrich development appears on page 1)

Looking outby from Position 3 showing the switch to the run-around and the track leading back. The white wall to the right is the limit of excavation for the run-around track.



Steel timbering spanning run-around and load tracks as viewed from Position 4 of the drawing. Steel columns are installed to support the steel cross beams at No. 1 mine.

climbing the ramp. Sand in only a limited quantity on the track at the steepest part of the ramp indicates that no trouble is experienced in pulling out.

Under the new arrangement the cars are uncoupled as they leave the trip feeder and are pulled singly by the car haul to the knuckle, from which they coast over the scale to the dump. Car-haul chain dogs spaced 20 ft. apart engage fittings on the bottoms of the cars. Just inside each rail is a row of safety dogs with the individual dogs in each row 4 ft. apart. These engage the lower corners of the car bodies in case the chain dog should slip.

Although the roof is a massive stone, steel beams on steel columns were installed to support sections of the roof where there appeared the slightest possibility of weakening. An electric thrower with position signals was installed on the switch leading to the run-around. Complete with a neon sign radiating the employee greeting, or password, "Be Careful," this No. 1 mine bottom presents an appearance in tune with its efficiency.

•

Machine and Trolley Wire Utilized in Bonding

Two bonds ends used for some time at the Gatliff (Ky.) mines of the Gatliff Coal Co. are described by J. C. King, chief electrician. One is made from scrap machine cable and ½- or ⅜-in. pipe or tubing. A sample with the end sawed away to reveal the fusion of the metals is shown in the accompanying illustration. The cable is put through the pipe with the ends flush and then is welded, using General Electric W20 electrode. "We have some of these bonds that have been in use for about ten years and are in good shape now.

"Something over a year ago we had a short entry to bond that we thought would be used only a short time. We did not want to use new bonds, as it was laid with scrap steel. No machine cable was available, so we tried out the second scheme shown in the illustration. This bond is made of scrap trolley wire brazed to a piece of ¼ x 1 x 2½-in. sheet metal, also scrap. This

These bonds utilize scrap machine cable and trolley wire.

is welded to the rail with steel electrodes. These bonds have been in use for over a year and still are in good condition."

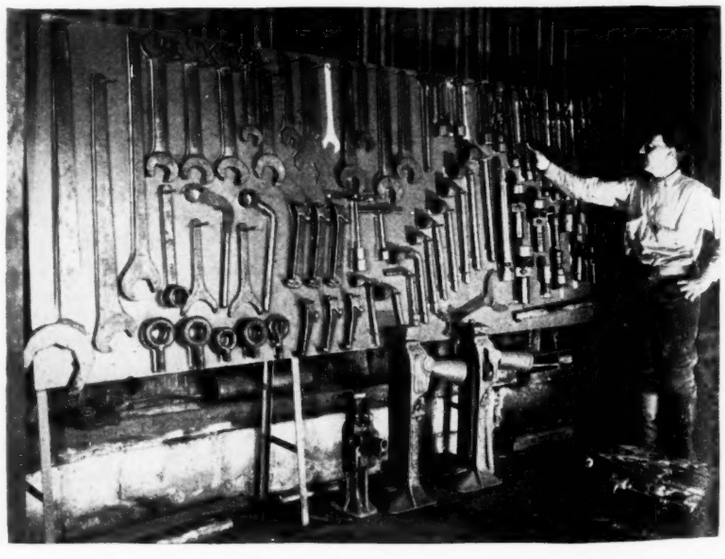
Tool Board Shows Missing Units

Availability of proper tools always has been of first importance in efficient and low-cost maintenance, and, now that mechanization of loading has brought new machinery into the picture, high-lighting delays, the tool equipment deserves closer scrutiny.

A new tool rack in the out-side shop at Federal No. 1 mine, Koppers Coal Co., Grant Town, W. Va., is shown in the accompanying illustration. The face of the board is black and the shape of each tool is painted on it in white to correspond exactly with its position. This permits the master mechanic to check the board at a glance. In front of the board stand three jacks which complete the general equipment of portable tools.

Many new methods of tool handling have been tried but it is doubtful if any scheme outranks the old reliable tool board from the standpoints of quickly finding a tool and quick checking to show that all tools have been returned after a job.

That is not a snow-white open-end wrench in the top row, center, but a painted indication that an important tool is missing from the board.



WHAT'S NEW IN THE FIELD

Hard-Coal Allocation in Effect: Executive Group Named

The voluntary allocation plan drawn up by Pennsylvania anthracite producers and approved by Governor James—*Coal Age*, February, p. 103—went into effect during the week ended Feb. 3, when the production quota was placed at 960,000 tons. Output allowance for the second week was halved to 480,000 tons; that for the week ended Feb. 17 was 720,000 tons.

All the committees provided for in the plan were completed on Feb. 9 with the naming of the executive group, composed of: John Ira Thomas, State Secretary of Mines; Frank Earnest, Jr., president of Anthracite Industries, Inc., and Martin F. Brennan, president, District 9, United Mine Workers.

The emergency committee of nine includes: Mr. Thomas; Attorney General Claude T. Reno; and Secretary of Commerce Richard P. Brown, for the State; W. W. Inglis, president, Glen Alden Coal Co.; Ralph E. Taggart, president, Philadelphia & Reading Coal & Iron Co., and Santo Volpe, president, Volpe Coal Co., for the operators; and Michael J. Kosik (District 1); Hugh V. Brown (District 7) and Mr. Brennan, U.M.W. district presidents, for the miners. The producers' advisory board has named as chairman F. W. Leamy, senior vice-president, Hudson Coal Co.; secretary, Louis C. Madeira 3d, executive director, Anthracite Institute.

The emergency committee has delegated Mr. Thomas and D. Leonard Corgan, its secretary-treasurer, to notify all cooperating producers—representing more than 95 per cent of the anthracite industry of the State—of the weekly production estimates, by which the operators have agreed to abide. Secretary Thomas said the emergency committee was "doing a nice job" of handling details of the allocation plan.

Alan C. Dodson, president of the Anthracite Operators' Association and head of Weston Dodson & Co., said: "If the plan remains operative long enough to set things anywhere near aright in the industry it will have far-reaching effect both on producers and retailers. Nothing short of such drastic action can bring about stabilization in the anthracite industry. The plan seems to us to indicate the determination on the part of all concerned that the disastrous conditions of last summer shall not again prevail. The industry is indebted to Governor James for his cooperation, and it is to be hoped that the desired results will be achieved, to the end that both line companies and individual producers can get their heads above water."

According to Governor James, at least a year will be required to test the effectiveness of the quota plan for stabilization of the industry. "I think this plan will not be determined in fair weather," said the Governor; "it will be determined in stormy weather. It may demonstrate that allocation is one of the methods whereby some of the troubles of the industry can be solved. It does not necessarily follow that compulsory allocation through State control under legislation would be desirable."

•

Nashville Tests Smokeless Fuel

Tests of the smokeless and heating qualities of processed coal were started in a dozen Nashville (Tenn.) homes during the first week in February as part of a campaign to eliminate that city's smoke. A carload of each of two types of processed coal was obtained for use in a list of homes suitable for the tests selected by the Women's Civic Forum. The tests were to continue for three weeks. The tests, which are being supervised by the City Smoke Commission and service experts from the manufacturers, are sponsored by a local newspaper.

Keeping Step With Coal Demand

Bituminous Coal Stocks

(Thousands of Net Tons)

	Jan. 1 1940	Dec. 1 1939*	Jan. 1 1939
Electric power utilities	8,959	8,858	8,491
Byproduct coke ovens	7,993	8,115	7,462
Steel and rolling mills	692	665	687
Railroads (Class 1)	5,517	5,341	5,629
Other industrials †	13,791	14,423	11,401
Total	36,952	37,402	33,670

Bituminous Coal Consumption

(Thousands of Net Tons)

	Dec. 1939	Nov. 1939*	Dec. 1938
Electric power utilities	4,598	4,406	3,684
Byproduct coke ovens	6,668	6,457	4,742
Steel and rolling mills	1,039	1,055	837
Railroads (Class 1)	7,424	7,322	7,161
Other industrials †	11,189	11,003	10,109
Total	30,909	30,243	26,533

* Revised. †Includes beehive ovens, coal-gas retorts and cement mills.

Mine Modernization to Keynote Cincinnati Coal Convention

Continued progress in mine modernization will keynote the Seventeenth Annual Coal Convention and Exposition of the American Mining Congress, to be held at the Cincinnati (Ohio) Music Hall, April 29-May 3. Under the leadership of Harry M. Moses, president, H. C. Frick Coke Co., and national chairman of the program committee, a group of 103 coal-operating men has worked diligently for nearly three months planning a program that will include discussions by outstanding industry authorities on all phases of coal-mine operation as well as on economic problems.

Improvements in face-preparation methods will feature the opening session, Monday, April 29, when J. W. Ansted, electrical engineer, Templeton Coal Co., will present a paper on "Coordination of Face Preparation with Mechanical Loading." Following this will be an address on "Face Preparatory Methods."

Since scientific knowledge and technical training are becoming recognized as essential in coal mining, the Monday afternoon session will be devoted to questions of enrollment of young men in mining engineering schools and to illustrations of how scientific knowledge is being directly applied to conversion equipment and roof support. Speakers and their subjects at this session include: H. R. Wheeler, industrial relations manager, Pittsburgh Coal Co., "Educational Training"; K. L. Konnerth, chief electrical engineer, H. C. Frick Coke Co., "Rectifiers and Other Conversion Equipment"; and Frank G. Smith, general superintendent, Sunday Creek Coal Co., "Roof Support in Coal Mining."

Surface preparation and mechanical loading and conveying will hold the stage on Tuesday. The surface-preparation session will give a comprehensive account of the present status of coal cleaning. Topics to be covered and their authors include: "Economic Possibilities of Small Coal-Cleaning Units," J. P. Horne, general superintendent, Raven Red Ash Coal Co.; "Recovery and Utilization of Refuse From Cleaning Plants," K. A. Spencer, vice-president and general manager, Pittsburg & Midway Coal Mining Co.; "Modern Coal-Cleaning Practice—Appalachian Field," Joseph Pursglove, Jr., general manager, Pursglove Coal Mining Co.; and "Modern Coal-Cleaning Practice—Rocky Mountain Field," Carl S. Wes-

terberg, chemist and preparation engineer, Utah Fuel Co.

The application of mechanical loading to conveyors will be the subject of Tuesday afternoon's session. Starting with the duckbill mechanical loader, descriptions will be presented of the combination of mobile machines and conveyors, and will then show the most recent practices in multiple conveyor systems with hand loading. These papers will be presented: "Duckbill Mechanical Loading," V. P. Picklesimer, general mine superintendent, South-East Coal Co.; "Mobile Machine-Loading on Conveyors," G. S. Jenkins, general superintendent, Consolidated Coal Co.; "Multiple-Unit Conveyor Mining," W. J. B. Mayo, superintendent, Koppers Coal Co.

Maintenance of equipment and modern practices in the operation of mobile mechanical loaders are scheduled for consideration on Wednesday. Papers scheduled include: "Shuttle Haulage for Mechanical Loading," H. B. Husband, general manager, fuel mine operations, Chesapeake & Ohio Railway Co.; "Track-Mounted Loading Machines," R. L. Adams, general superintendent, Old Ben Coal Corporation; and "Successful Pillar Recovery With Mobile Loaders," J. M. Connor, general superintendent of mines, West Penn Power Co.

To Discuss Economic Problems

National economic problems which directly affect the welfare of the coal industry will be considered on Thursday morning. E. C. Payne, consulting engineer, Consolidation Coal Co., will open with a paper on "Effect of Utilization on Coal Production"; following this will be an address on another subject of general interest, the speaker to be announced later.

Safety, the first consideration in mine operation, will be the topic at Thursday's afternoon session. Papers to be presented cover the three important subjects of safety in mechanical mining, sources of hazards, and responsibility for accident reduction. Dr. L. E. Young, consulting engineer, will speak on "Safety Records With Mechanical vs. Hand Mining"; "Accident Sources and Overcoming New Hazards" will be the subject of a paper by L. A. Hill, assistant superintendent, Chicago, Wilmington & Franklin Coal Co., while E. W. Wynne, compensation adjuster, will discuss "Fixing Responsibility for Mine Accidents."

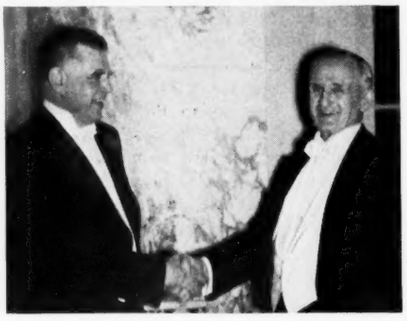
There will be no convention session on Friday, but the exhibition halls will be open so that the manufacturers' displays may be inspected. The Manufacturers' Division, under the leadership of Frank R. Mueller, vice-president, Roberts & Schaefer Co., is again arranging an exposition which will completely fill the four exhibit areas of the Music Hall. Two months in advance of the show, fully 95 per cent of the exhibit space was under contract.

A program of evening entertainment is being planned under the direction of J. W. Haddock, vice-president, Sullivan Machinery Co., chairman of the entertainment committee. One of the highlights will be an athletic night, when eight amateur boxing bouts are to be staged, entries to be obtained from among coal-mine employees who hold cards in the Amateur Athletic Union. The climax will be the annual "speechless" banquet on Thursday night.

Engineers Reveal Better Operating Methods At Mine Institute's 70th Session

WITHOUT fanfare, the American Institute of Mining and Metallurgical Engineers met in New York at the Engineering Societies' Building, Feb. 12-15, and celebrated its 70th birthday with a range of papers exhibiting well the breadth of its interest, discussing many subjects its forbears surely never even imagined.

Beginnings of better roof support for mine roadways were set forth by W. W. Wirth, division engineer, and W. L. Dennen, special engineer, Hudson Coal Co., in an address briefed by the latter. One hundred Toussaint-Heintzman steel-arch sets on 3-ft. centers have been installed in No. 11 slope, Marvine colliery, north Scranton.



H. G. Moulton, incoming president (left) grasps the hand of Donald B. Gillies (retiring president)

Here a 10-ft. bed has crushed to 5 ft. Each set has three V-sections—an arch and two curved legs. The three segments, separated by small wood blocks, match each other near their mating extremities and are held together by heavy clamping V-bolts, thus making yielding joints which will slide before stresses in the set become so great that the steel will be permanently deformed. Total cost per set installed is $25.44.

Corrugated steel liner plates of No. 12 gage (16x36 in.) with flanged edges were used in an overcast at Gravity Slope colliery, Archbald, Pa., by the same firm in 1932. Resting on wood sills and 11 ft. in diameter, its cost was $15.30 per linear foot installed. Other liner plate work, 5 and also 10 ft. in diameter, was installed through caved workings in 1931 and 1932 by the Hudson Coal Co., at No. 4 slope, Boston colliery, Larksville, Pa. Plates have "rusted somewhat and sills are beginning to rot."

In 1932, added Mr. Dennen, the Glen Alden Coal Co. inserted six Muspratt roof-support sets of precast vibrated concrete in No. 2 tunnel, Woodward colliery, near Wilkes-Barre, Pa. These have straight sloping legs shaped to resist bending, and stand on wood or Celotex compression blocks in boxes of reinforced concrete. Voids in the box around the legs are filled with flexible sealing compound. The cambered collar, trussed with a steel rod, has concave seats in which the convex tops of the legs fit.

Both vertical faces of the collar ends have hemispherical joints equipped with stout steel hooks that articulate with longitudinal spreaders that stretch between ends of collars of adjacent sets. Between sets is an intermediate cambered collar, hooked to the spreaders and trussed with a steel rod. Though submerged for 18 months in acid water and heavily loaded in a badly caved area, the sets gave satisfactory service. In 1935, the Glen Alden erected, in No. 64 tunnel of the same colliery, 1,000 ft. of such support. Muspratt sustention, said Mr. Dennen, costs twice as much as wood. Shaefer lining, when of concrete, may be attacked by acid water, but its blocks can be made of brick with Vitribond connections, declared Cadwallader Evans, vice-president in charge of operations, Hudson Coal Co. That company has 100 installations of Shaefer lining. His company, said C. A. Gibbons, general manager, Susquehanna Collieries Co., "ducks into rock" and finds that cheaper than erecting arches.

Longwall Without Packwalls

Showing how timber cribs without the aid of packwalls support longwall roof in Alabama, L. I. Cothern, professor, mining engineering, Virginia Polytechnic Institute, declared that at Barney mine, Alabama By-Products Corporation (with coal 33 in. thick), the main haulage road in longwall entries is laid centrally in a heading 35 ft. wide and the road in which coal is loaded in cars from the longwall working lies in one of equal width, with a 30-ft. pillar between headings.

A narrow room, or "down hole," is driven at right angles to the car-loading road for a distance of 300 ft., and the entire rib on one side of the down hole is used as a longwall face, which is advanced until longwall and rear faces are 150 ft. apart; then the longwall is abandoned. In the loading heading, rock-filled cribs, 6x6 ft., are set at regular intervals along the center pillar and, as the longwall advances, rock-filled cribs are set in two staggered rows with the cribs in each row at 18-ft. centers, one row at the gob edge of the loading heading and the other just inside the gob line. Coal is loaded into cars by a boom which is moved up as the face advances. Longwall workings are so started as to leave a 20-ft. pillar between one completed longwall working and the down hole of the next.

At Praco mine, of the same company, added Dr. Cothern, rooms were driven instead of longwall wherever streams at high water would submerge the area being mined, but where there was no submergence, the Barney system was attempted with, however, no cribs on the center-pillar side of the loading-track heading but with continuous cribs on the longwall side. Behind the longwall face, which goes from entry to entry, permanent cribs were placed, 25 ft. apart in both directions, supplemented by 8-in. posts at 4-ft. centers.

After advancing the longwall face only 130 ft., the roof suddenly caved, irrecoverably burying much of the conveyor. In this entry, the system was continued, but in another, nearer the surface, after a fall, room workings were substituted.

In still another entry, here under deeper

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Smoothing out the kinks in coal moving operations is, in most cases, a three-sided job. This has been amply demonstrated in the successful collaborations of mine operators, builders of belt conveyor systems, and U. S. Rubber Company engineers. From this triple effort have come many profitable, streamlined systems of mechanization, one of the latest of which is at the Powhatan Point, Ohio, mine of the Powhatan Mining Company.

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C. E. Lawall (left) acclaimed chairman of Coal Division. To right in line: D. R. Mitchell, A. W. Hesse, H. E. Nold and E. J. Kennedy, Jr.

cover, the longwall face was advanced 220 ft. without a roof fall. Three breaker-prop rows were set to protect the face. Timbers, not cribs, then were shot out in the rear of the room for 75 ft. from the rear pillar, and a fall followed. Hereafter, longwalls will be advanced only 165 ft. and a new longwall working started.

At Mine No. 1 of the Southern Coal & Coke Co., said Dr. Cothern, the seam is 32 in. thick. "Double entries" leave the slope on both sides and are driven 170 ft. to 250 ft. so as to provide a sufficient pillar before longwall is started. Then an "upshot," or narrow room, is driven to the entry above, and a longwall started from the side of the room. These longwall workings extend to the boundary, 3,600 ft. away. A single heading suffices after the upshot is passed; to this end top is removed in the longwall face for a width of 10 ft.

Similar are the workings of No. 4 mine of the same company in a seam 62 in. thick of which 16 in. is parting. Here, however, headings are driven in advance of the longwall to permit a car trip to be placed behind the loading boom of the conveyor. Though the roof support behind the wall is much like that at Praco, the cribs are more frequent and are staggered.

Longwall progress at right angles to the entry with the conveyor in the center and face conveyors right and left characterize the workings at Empire mine, DeBardeleben Coal Corporation. Here pillars are left between the gob of the longwall working and heading. Breakrows of cribs are set skin to skin at 100-ft. intervals across the working parallel to the haulway.

With longwall, 80 to 90 per cent of the coal can be obtained despite barren areas, declared P. H. Haskell, Jr., manager, Alabama By-Products Corporation; otherwise only 40 to 50 per cent would be saved. With the long face established, there was opportunity to go around the far end of the pinched area.

In a free-discharge Rheolaveur plant, said C. P. Procter, superintendent, Champion No. 1 preparation plant, Pittsburgh Coal Co., speaking for himself, J. T. Crawford, superintendent of docks, Pittsburgh Coal Co. of Wisconsin, and J. A. Younkins, foreman of the same plant, authorities differ as to the importance of sedimentation beds. In their opinion, when the heads of the beds are held far back along the classification section, thus deepening the beds for the entire length of the launder, though much less water is used and what is used has a smooth surface, the ash in the fine coal is invariably higher.

As the discharges from the Rheo boxes above the bed disturb the upper part of it, fine refuse does not settle readily in the lower launders. Hence, if the discharge of all the boxes from each launder were returned to the head of the lower launder and not dropped into the bed, the coal would be better cleaned.

When sufficient push water is used, beds are shallower and less compact, each particle is less intimately associated with other particles, thus giving the higher-gravity material from the beds above a much better opportunity to classify in time to pass through the boxes before passing off in the launder overflow. In this case, the water surfaces in the launder are quite rough and require more attention, lest the sedimentation bed (especially in the second launder from the top) be lost entirely. When more water is used, material classifies by specific gravity and, when less water is provided, material tends to classify by size. In the first case, the coal is cleaner but more water has to be handled, and, in the other, the washing is less efficient but less water has to be circulated. Vertical current in the boxes or slots in launder bottoms, raising of barrages and increases of push water, with resultant bed loosening, has often reduced 1.60-sink material in clean coal from 1.0 to 0.4 per cent.

With air-sand equipment, after ceasing to blow, one can cut the bed and discover where the coal is. Using water, the menstruum would have to be frozen suddenly to get the same result, said Thomas Fraser, coal preparation engineer, Bituminous Coal Division. With the air-sand process, bedding improves but little with distance, and long launders are not needed.

By using flocculating agents, quantity of solids in circulating washery water can be kept uniform, and the water will be cleared of solid matter more speedily than without them, asserted H. F. Yancey, supervising engineer, U. S. Bureau of Mines, speaking for himself; R. E. Zane, junior chemical engineer, of the same organization; Walter Wood, Pittsburgh Coal Co., and J. T. H. Cannarella, former research fellow, University of Washington. Flocculants also lower ash and moisture in the washed slack and help to keep coal out of the refuse. Yet few American coal washeries use them. Quantity of agent required for any given flocculation decreases the higher the rank of coal.

Potato starch, wheat flour and cornstarches, say the authors, are effective coal flocculants, but have their greatest effect over a shorter range of concentration than electrolytes. In flocculating shale, electrolytes are more effective than starches, but some of the former might be objectionable in actual use. Unless much material is below 200-mesh, flocculation probably is unnecessary. Flocculated slurries filter much faster than unflocculated. As percentage of solids increases, added Dr. Yancey, the advantage from use of flocculant decreases. Where fluid is 30 to 35 per cent solids or less, the flocculant is helpful but scarcely worth while at higher figures. When flocculants are used the filter cake has more moisture. Dry lime has been added to correct this. Ferrous sulphate is not as good a flocculant as ferric chloride and not desirable *per se*. Water used in the tests was unusually free of lime and soda, with a pH of about 7 before adding agent.

Extremes Meet in Gross Sample

Softening temperature of coal ash as determined in the laboratory, regretted G. B. Gould, president, Fuel Engineering Co. of New York, in a paper prepared by him and H. L. Brunjes, fuel technologist of the same company, has not been found an unfailing index of clinkering, slagging or non-clinkering, non-slagging action in the furnace at any given temperature, perhaps because, in the laboratory, the ash is thoroughly mixed before its exposure to heat, whereas in the coal bed there is no such intimate representative mixture of the ash prior to combustion. Clinker and slagging obviously occur in a furnace at temperatures below the laboratory-determined ash-softening temperature.

To fractionate the coal, it was separated by float-and-sink methods into four groups and then again into six or seven groups by size, all of it first having been crushed so that 95 to 100 per cent of it would pass a 4-mesh screen. It was found that an Indiana County (Pa.) Upper and Lower Freeport coal having a bulk ash-softening temperature of 2,700 deg. F. had 24.3 per cent of its ash with an initial deformation temperature (i.d.t.) of under 2,200 deg. F. and 65.0 per cent of its ash with an i.d.t. at or exceeding 2,800 deg. F. A thick Freeport coal from Allegheny County, Pennsylvania, had almost equal proportions of ash (27.2 and 27.8 per cent) having respectively

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i.d.t. of 2,800 deg. and over and of under 2,100 deg. All of the ash in all of the coals having an i.d.t. below 2,300 deg. was found in the 1.5 sink, and this material contained 40 to 50 per cent of ash.

A coal persistently giving muddy clinker was made acceptable by removing minus 20-mesh coal, about 3 per cent of the entire tonnage, instanced H. L. Griffin, mining engineer, Morgantown, W. Va. At a time when the consumer was interested mainly in the action of fuel on the grates, it was decided that fusing temperature should be determined in a reducing atmosphere, said E. G. Bailey, vice-president, Babcock & Wilcox Co., but now slagging on the tubes is becoming so important a nuisance that the effect of the higher temperatures of slagging in an oxidizing temperature must be considered. With a slag-tap furnace, what has been rated bad in a coal becomes good, and good becomes bad. He favored use of the i.d.t. Cleaning coal sometimes removes the ash material that prevents clinkering and slagging. In the South, some firemen used to cover fires with oyster shells to improve coal performance. Mr. Gould said his determinations seemed significant with regard to slagging, but in use, diverse i.d.t. and fuel behavior had not been effectively correlated.

A thermodynamic study of the swelling pressure developed by a coal charge during carbonization was outlined by Dr. Walter Fuchs, of Pennsylvania State College. In this study, he admitted, little attention had been paid to the variables—viscosity, surface tension and turbulence of the plastic layer, compressibility and wettability of coke and coal and heat conductivity.

Swelling Coal Affects Stokers

Trouble with operation of stokers begins with coals having a British swelling index of 5 or 5½, declared L. C. McCabe, assistant geologist, Illinois Geological Survey, showing in his own behalf and that of S. Conzo and O. W. Rees, a motion picture of domestic stokers in action. Difficulty starts at that point, agreed R. A. Sherman, Battelle Memorial Institute, but some coals with B.s.i. of 8 and 9 may give no trouble. Lower-rank coals, asserted Dr. McCabe, do better than higher-rank coals under hold-fire conditions, but higher-rank coals are the better during cold weather. D. R. Mitchell, head, department of mining engineering, Pennsylvania State College, said that Saline County coal was made suitable for domestic stoker use by eliminating all sizes but $\frac{5}{16}$ x $\frac{3}{16}$-in.

Describing conveyor operations in an unnamed mine near Wilkes-Barre, John S. Marshall, mining engineer, Scranton, Pa., declared that double-arm overhead-drive units were favored except where bed thicknesses were 30 in. or less, in which case side drives were used to avoid having to shoot down rock for height. These side-drive units, because of concentration of stress on one side of the machine, resulted in excessive breakage and maintenance cost. Ball frames with universal tops were found preferable; their life was about two years of double-shift service. After that frames wore through.

Balls of plastics or rubber, if devised, should extend life of equipment and reduce noise. An alloy-steel wearing strip seems a needed improvement. To prevent breakage, $\frac{3}{16}$-in. steel troughs were substituted for standard ⅛-in. pans. Swivels were equipped with pendulum and jacks when more than five troughs were located ahead of the swivel. Some better way is needed of conveying motion around a trough-line turn. Strains set up in the trough line from change of direction eventually destroy the troughs near the swivel and the swivel itself. Bell cranks and drive rods have been used, but, because of poor design and light construction, are suited for operation of only about 50 ft. of troughing.

Shaking-conveyor mining in low and in caved and flushed coal beds increased production 1.55 tons per man-day over hand loading direct into mine cars, with a substantial saving also in transportation cost. As conveyors were put into the more difficult places, with equal conditions the comparison should favor them even more. First cost and maintenance of conveyor equipment totaled 8.26c. per ton and $1.383 per machine shift operated.

With conveyors, shorter working days did not decrease production; with hand work, output dropped 8 per cent. Economies largely effected by shaking-conveyor mining extended mine life five years, and nearly 4,000,000 tons of coal was recovered, much of which could not have been mined by former methods. Eighty-seven units were in operation. Table I shows the life of shaker-chute equipment.

Table I—Production of Coal per Unit of Shaker-Conveyor Equipment

Item	Tons
Conveyor troughs	538
Trough bolts	208
Ball frames	740
Swivels	30,994
Drivepans	35,567
Jacks	6,253
Drive units	48,214

Coming Meetings

- Canadian Institute of Mining and Metallurgy: 44th annual meeting, March 11-13, Royal Alexandria Hotel, Winnipeg, Manitoba, Canada.
- Purdue Coal Conference: April 2 and 3, Lafayette, Ind.
- American Chemical Society: 99th meeting, April 8-12, Cincinnati, Ohio.
- Midwest Power Conference: April 9 and 10, Palmer House, Chicago.
- American Mining Congress: seventeenth annual coal-mining convention and exposition, April 29-May 3, Music Hall, Cincinnati, Ohio.
- Anthracite Industries Conference: May 9 and 10, Bethlehem, Pa.
- Northern West Virginia Coal Association: annual meeting, May 13, Fairmont, W. Va.
- Mine Inspectors' Institute of America: annual convention, May 27-29, Claypool Hotel, Indianapolis, Ind.
- Stoker Manufacturers' Association: annual convention, June 6 and 7, Hot Springs, Va.
- American Society for Testing Materials: 43d annual meeting, June 24-28, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

Reduction in cost per ton, said Mr. Marshall in discussion, was 32c. per ton for labor which with 8.2c. per ton for first cost and maintenance would make a net reduction of 23.8c., but with machine, less mine timber was used, less material had to be transported, less rock had to be handled, hazards were reduced and tonnage was increased, with consequent reductions in cost. When a shaker chute is short, it can be operated at high speed, but a long pan line should be driven less rapidly. Increasing pan weight per unit length had no adverse effect on the operation of the shaking conveyor. All grief in operation is included in the figures, and all the work done was in recovering old pillars.

"Chisel" mining-machine bits, said A. L. Barrett, maintenance engineer, Pittsburgh Coal Co., are rarely used and then only in places where "pick-point" bits would fail to break the coal away between adjacent bit paths. Sometimes chisel bits are used with standard bits to correct this failing, which is known as "coring."

With high-performance bits, cutting machines will cut rolls, clay veins and spars that an ordinary bit would not cut or would cut only with increase in power and in maintenance cost of machine. Extensive tests, however, do not bear out the general contention that improved bit material or better tipping will reduce maintenance cost and power consumption. If a bit is so shaped as to cut coal efficiently, the power consumed, both when the bit is new and when it is worn so as to be ready for changing, is about the same regardless of the material from which the bit is made.

Fewer Bit Positions Desired

As few bit positions, continued Mr. Barrett, should be used as is compatible with character of the coal being cut. Usually this depends on whether the coal will break loose readily between the channels which the several picks make. The number of positions runs from five to ten, with nine- or ten-position chains prevalent, but sometimes fewer might serve. For uniform coal, which does not tend to core, the "flying wedge" probably is the best lacing and, in coal of rather hard structure, even a flying wedge will give good results if extra top and bottom bits are added. Where hardness varies from top to bottom of kerf, satisfactory operation may be obtained with some modification of wave lacing.

Bits must have side and vertical pressures balanced, according to Mr. Barrett, if they are to cut well. Outside bits should be set at 45 deg. to the vertical where the bits tend to be squeezed together. Several chains with a reduced bit angle were installed in a Pittsburgh Coal Co. mine, but this arrangement definitely reduced cutting ability of the machine and increased power consumption at least 30 per cent.

It is doubtful whether an installation of the usual bit-sharpening machine will reduce gross cutting costs, as a good blacksmith, when he quenches his bits as he forges them, heat-treats his steel more effectively. Hammering also during hand forging compresses the grain, thus yielding a better tip structure. At most large mines, saving in bit cost alone will take five years to return the cost of a bit sharpener.

In the Pittsburgh Coal Co.'s heat-treatment

of machine-sharpened bits, they are run down on a conveyor, allowing the forging heat to extend to the bit tip, after which the bit is dropped into a mixture of water and a tempering agent, which latter delays the quench. With this heat-treatment, the grain structure is not good. However, extensive experiment at two mines indicated that cost of cooling, reheating, quenching and drawing did not justify itself in increased bit performance. Experience at one mine is not determinant of what is best practice at another. All coal was cut, discussion developed, with a dry cutter bar and a shortwall machine.

Defining fan-capacity factor as the air volume supplied by a fan at a difference of pressure equal to unity, Raymond Mancha, manager, ventilation division, Jeffrey Manufacturing Co., declared that its value, when equal leakage along the course of the air current is postulated, is very nearly proportionate to the volume ratio raised to the half power. Under the same conditions, the fan pressure will be proportionate to the volume ratio and the fan air horsepower to the second power of the volume.

When choosing fan-operating characteristics at a projected mine, one should calculate first the ideal fan-capacity factor, fan pressure and fan air pressure, assuming tight stoppings; second, decide on a reasonable volume ratio that is likely to be maintained under local conditions and, third, multiply the ideal fan-capacity factor, fan pressure and fan air horsepower by the one-half power, the first power and the second power of the volume ratio respectively.

Describing the plant of the Pittsburgh Coal Carbonization Co., near Pittsburgh (see *Coal Age*, March, 1939, p. 45), C. E. Lesher, president, said that the product had an ignition temperature of 375 deg. C., as low as, if not lower than, many coals. Byproduct coke similarly tested will have ignition points between 460 and 520 deg. C.

Packaged fuel units in the United States usually consist of six cubical briquets weighing about 10 lb. tightly wrapped in heavy 50-lb. kraft paper and sealed with gummed-paper tape, reported R. F. Mitten, C. M. Eberling Co. In some sections, however, briquets are larger, aggregate weight being 15 lb.; briquetting and wrapping form a continuous operation. These packages are thrown in the fire with seals unbroken. Thus, coal shovel and coal bin are unnecessary equipment, and fuel is handled without mess.

Cube Screenings Uncrushed

Screenings varying from minus $\frac{1}{8}$ in. to minus $\frac{3}{4}$ in. are made into cubes without grinding, drying or heating. The more friable the coal, the larger the size of the screenings that may be used and the harder the structure of the product. Screenings are run into a power mixer with the binder and a little water. About 15 lb. of binder is used per ton of coal. After thorough mixing, the mass is fed to dies and loaded by plungers with a pressure of about 2,000 lb. per square inch. If more pressure is applied, the cubes will craze or crack.

After packaging, product is placed in a drying room at about 160 deg. F. for eight hours, when it becomes ready for use. The heat drives out moisture which escapes through the wrapping paper, shrinking it closely around the cubes and hardening the glue. A single unit will make 300 packages in an hour and can be run by two men. Three men can handle two units. With some exceptions, coal can be used if it ranges from 15 to 40 per cent volatile and has some coking qualities. Lignite and sub-bituminous coals have not proved briquettable because of their non-caking characteristics. Low-volatile coal can be mixed with petroleum coke.

Packaged fuel, declared Mr. Mitten, burns slowly and makes much less smoke than the coal from which it is made. The fire, because of uniformity of fuel, is controlled readily. In the last six years, about 90 plants have been constructed in thirteen States. Annual production in the 1939-1940 season should be 300,000 tons with a retailed delivered value of about $3,000,000.

With Pocahontas No. 3 coal, the largest size briquetted is $\frac{3}{4}$ in.; with Illinois, Ohio and Pittsburgh coal, $\frac{1}{2}$ in.; and with petroleum coke, $\frac{1}{2}$ to $\frac{3}{8}$ in. Total cost of production, including overhead, is about $2.25 per ton.

An article on sizes and grades of coal produced in the United States in 1937, by Thomas Fraser, W. L. Crentz and F. G. Tryon, Bituminous Coal Division, which showed there were 169 sizes in District No. 8 (West Virginia, east Kentucky, Tennessee and Virginia) and 126 in District No. 10 (Illinois), brought a statement from H. E. Nold, professor of mining engineering, Ohio State University, that many of these were not established to satisfy consumer needs but for sales argument only. The sales of these many sizes is not broken down between industrial and domestic use, declared J. E. Tobey, manager, engineering department, Appalachian Coals, Inc., and is not known; the Bituminous Coal Division might well make this breakdown. H. N. Eavenson, Eavenson, Alford & Auchmuty, Pittsburgh, Pa., said he thought twelve to sixteen sizes would cover all needs.

Only six sizes are made by the Northwestern Improvement Co., declared E. R. McMillan, chief mining engineer, but 75 per cent of the production is used for locomotives. Most tipples, recalled G. R. Delamater, assistant vice-president, W. S. Tyler Co., make only eight to ten different sizes and the large number Mr. Fraser mentions are prepared by mixing conveyors. Not all multiplicity of sizing is wild, said L. A. Chipman, Southern Coal & Coke Co. Of some coals, only $\frac{7}{16}$ x $\frac{7}{16}$ in. will make a good domestic-stoker fuel. Complaints that too many fines are found in wide ranges of coal can be remedied by layer loading, declared Mr. Eavenson, for, with this method, fines do not segregate and are not evident to the eye.

Though Thermit welding was first applied to main-line mine-haulage track in 1935, at the end of 1939 more than 6,000 welds had been made in that service, stated H. T. Thompson, Metal & Thermit Corporation. For all practical purposes the electrical conductivity of the welded joint equals that of the rail, so joint resistance is eliminated. Other advantages are: (1) no more bond and joint maintenance, (2) smoother transportation, reducing derailments, coal spillage and equipment repair, and (3) 25 to 40 per cent increases in rail life. Cost of replacing rail joints with Thermit welds is $5 to $6 per joint, of which $3.50 is for materials and equipment and the rest for labor.

A paper presented by P. B. Bucky, associate professor, Columbia University, for himself and David Sinclair, research assistant in mining, covered photo-elasticity and its application to mine-pillar and tunnel problems. The early part of this paper, and that germane to coal mining, was reported in *Coal Age*, March, 1939, p. 74. A trip to the laboratory where tests, photo-elastic and barodynamic, are being made was provided Feb. 15.

Explosives' Fatalities Decline

Though explosives fatalities underground were reduced from 135 in 1918 to 42 in 1938 with a low of 34 in 1933 and though millions of tons produced per similar fatality rose from 5.0 in 1918 to 9.6 in 1938, with a top of 11.3 in 1933, argued B. L. Lubelsky, consulting mining engineer, Washington, D. C., fatalities caused directly or even indirectly by man failure may be increasing and all the improvement effected can be credited solely to the displacement of blasting powder by permissibles and of fuse by electric blasting.

In discussion, he added that, with mechanized mining, shots are fired by one of the machine crew who often is so busy with other duties that he becomes careless. Prior to the advent of machines, shotfirers were becoming more numerous; now fewer are employed. He was not clear where in an explosives charge to place the detonator, except that it should not be put near the end of a cartridge if the detonation induced in the cartridge by detonation of the cap is to extend to other cartridges laid in series from that end, for the detonating impulse gained in action over the short distance of an inch or so may be insufficiently violent to extend over the two crimps between cartridges and there may be dirt also between them. Such inert material may suppress the detonation.

Members of a mine-rescue team must be reliable and self-reliant not only physically but mentally fit, asserted C. J. Flippen, safety director, Norfolk & Western Ry. Co., Fuel Department, in a paper presented by J. J. Forbes, supervising engineer, U. S. Bureau of Mines. One member of such a team not in good condition or not thoroughly trained can destroy the effectiveness and good name of the whole crew and may be

Permissible Plates Issued

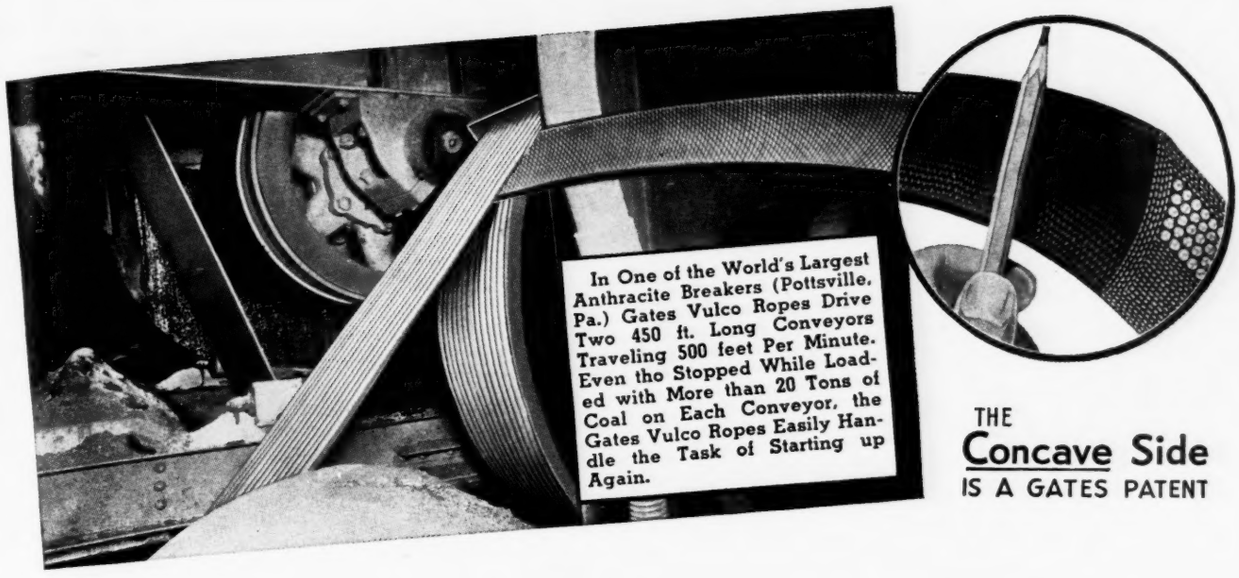
Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Goodman Mfg. Co.: Type 5-EOSC-IW "hitch-cutter"; 25-hp. motor, 250 volts, d.c.; Approval 389; Jan. 6.

Jeffrey Mfg. Co.: Type 61-IW face conveyor; 3-hp. motor, 230 volts, d.c.; Approval 390; Jan. 11.

Jeffrey Mfg. Co.: Type 61-EW elevating conveyor; 5-hp. motor, 550 volts, d.c.; Approval 391-A; Jan. 24.

Northwestern Improvement Co.: bucket elevator unit; 7½-hp. motor, 440 volts, a.c.; Approval 392-A; Jan. 30.



In One of the World's Largest Anthracite Breakers (Pottsville, Pa.) Gates Vulco Ropes Drive Two 450 ft. Long Conveyors Traveling 500 feet Per Minute. Even tho Stopped While Loaded with More than 20 Tons of Coal on Each Conveyor, the Gates Vulco Ropes Easily Handle the Task of Starting up Again.

THE **Concave** Side IS A GATES PATENT

Here's a Simple Fact

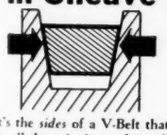
Prove it for Yourself and SAVE MONEY *on* V-BELTS *and* POWER

Pick up any V-belt having the ordinary straight sides and bend the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows narrower. (2) The bottom is under compression and becomes wider. (3) The sides of the belt bulge out. (Figure 1, at right).

This bulging of the straight sided V-belt in its sheave-groove costs you money in two ways—(1) The bulge causes uneven sidewall wear—shorter life! (2) The bulging side cannot evenly grip the sheavewall—a loss in transmission efficiency!

V-Belt in Sheave



It's the *sides* of a V-Belt that do all the *gripping* and get all the *wear*. That's why longer life for the *sides* means *longer life for the belt.*

In figure 2, you see how the precisely engineered concave side of the Gates Vulco Rope exactly corrects this bulging. Two distinct savings result. (1) The Gates Vulco Rope wears evenly—longer life! (2) The entire sidewall grips the pulley—carries heavier loads without slippage: saves the belts and also saves your power!

The Gates Vulco Rope is the only V-belt built with the patented concave side.

What Happens When a V-Belt Bends

FIG. 1

FIG. 2

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 741 Warehouse St.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 333 N. W. 5th Ave. SAN FRANCISCO, CAL., 2700 16th St.

the cause of another member or members being killed. No set standards can be determined for fighting and sealing mine fires but principles can be developed that will guide in the performance of such work.

Pyrite is being recovered at the plant of the Mineral Products Co. partly from the reject of the central coal-preparation plant of the Pittsburg & Midway Coal Mining Co., West Mineral, Kan., and partly from the refuse of hand-picking plants nearby, stated K. A. Spencer, president of the former company. Of the entire reject at the Pittsburg & Midway plant, only that derived from the washing of plus ¾-in. coal is used. From the combined rejects which serve as the feed at the pyrite plant 25 per cent of coal and 15 per cent of pyrite are obtained. The coal has 9 to 11 per cent of ash, and the pyrite 45.58 per cent of sulphur, 40.90 of iron, 4.12 of carbon, 3.80 of moisture, 2.40 of lime, 1.54 of insoluble, 0.27 of silica, 0.23 of sulphate sulphur, 0.52 of copper, 0.19 of zinc, 0.17 of lead, and 0.004 of arsenic, with 0.476 per cent undetermined.

The refuse is crushed in several stages to reduce it to 1¼ in. and then is cleaned in 4-cell round-bottom coal jigs to recover coal. The bed draw and hutch material from all four cells is then broken down to 2½-mesh and passed to a dewatering cone from which the deslimed underflow goes to two 4-cell rougher pyrite jigs. Bed draw and hutch material from the first three cells goes to similar pyrite cleaner jigs and material from bed draws and hutches of the first three cells of these two units passes to a dewatering drag and is conveyed direct to open-top cars for loading.

Six Tables Clean Pyrite

From the fourth cell, top product goes to a third dewatering cone, underflow from which passes to rolls, where it is reduced in size for treatment on three coarse sand concentrating tables. The overflow from the third dewatering cone is treated on two sand concentrating tables suited to its fine size. A final cleaning table finishes the product of all five tables.

Pyrite displaces brimstone in manufacture of sulphuric acid, liquid sulphur dioxide and phosphate fertilizer, but the product is likely to be discolored unless dust is controlled. The glass industry uses pyrite in the manufacture of amberglass, and cement manufacturers employ it in making a high-iron product. Sale of pyrite rids the plant of it where otherwise it would be a nuisance.

Further data on tests made on Pittsburgh coal pillars were offered by H. F. Greenwald, supervising engineer, Pittsburgh Experiment Station, U. S. Bureau of Mines. For these tests, coal in the experimental mine was cut away so as to leave pillars in place on mine bottom. Hydraulic jacks were then placed on pillars and pressure was applied. Among the facts ascertained were that the coal was already under considerable stress and that when pressure was applied without restraining the fireclay under pillars, the clay extruded and pulled the pillar in pieces from the bottom up. To retain the full pillar strength, concrete barriers were built to hold the clay in place.

In further tests, it was found that on applying the initial pressure the pillars compressed very little. Opening of cleats was the first indication of failure, which traveled from the surface of the pillar inward. Study suggested that width and height probably were the most important factors in pillar strength. Ratios of these two factors are shown in the accompanying table with other mathematical relations that, at first thought, might be postulated as existing between them.

Table II—Relation of Strength to Width and Height of Pillars

(Width—W; Height—H)

Ratio W/H Full-Height	Pillars $\sqrt{W/H}$	Strength Lb. per Sq. In.	Ratio Strength to $\sqrt{W/H}$
0.59	0.707	501	709
0.75	0.867	602	694
1.00	1.000	695	695
Half-Height	Pillars		
0.69	0.83	949	1,140
0.69	0.83	899	1,080
1.03	1.01	922	913
1.39	1.13	1,049	890
1.70	1.30	..	..

Part of the tests indicated that crushing strength increased roughly in proportion to the square root of width to height, which would result in the ratio of strength to the square root of W/H becoming a constant. Other tests, particularly with half-height pillars, showed, however, many departures from this theoretical conclusion, leading Mr. Greenwald to think that more work is needed to reach a decision on this and other factors.

Commenting on the causes of rock bursts and bumps, George S. Rice, consulting engineer, Washington, D. C., declared that the essential factors to be considered are depth of cover, pressure of a strong stratum of material adjacent to the mineral being extracted and method of mining. Usually, bursts or bumps do not occur where true longwall mining is employed or where the overlying stratum is a weak shale.

An example of subsidence in western Maryland was detailed by J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, in a paper read in his absence by H. I. Smith, mining engineer, U. S. Geological Survey.

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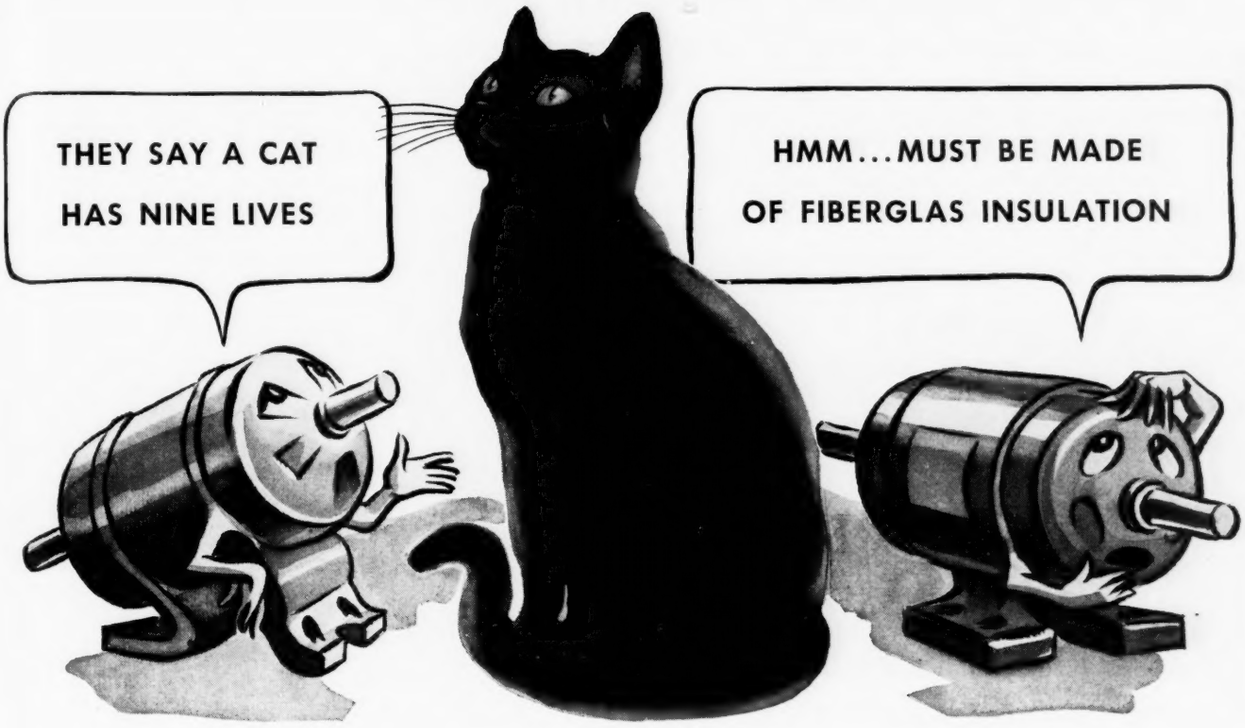
Court Upholds Labor Board

The Sixth U. S. Court of Appeals at Cincinnati, Ohio, on Feb. 15 entered consent decrees for enforcement of cease and desist orders issued by the National Labor Relations Board against the Ruckman Coal Co., Providence, Ky., and the Blue Valley Coal Corporation, Madisonville, Ky. The companies had previously been ordered to cease discouragement of membership in the United Mine Workers and alleged domination of independent unions.

The court also upheld orders of the Board against the Dawson Collieries, Inc., and Dawson Daylight Coal Co., Dawson Springs, Ky. On Oct. 23, 1939, the Board directed that they cease discouraging membership in the United Mine Workers; encouraging membership in the Progressive Mine Workers, and alleged domination of an independent union.



Fiberglas Insulated Motors Last as much as Three to Five Times Longer in Tough-Job Applications

ARE YOU HAVING TROUBLE with motors that need frequent rewinding? Would you like to get as much as *three to five times* longer life? Or virtually double the ability of your equipment to carry overloads without damage?

Very likely you *can*. A new discovery makes these things possible. A discovery that lengthens the life of many types of electrical equipment, almost beyond belief!

This discovery is Fiberglas* Electrical Insulation. And the reason that Fiberglas Insulation can give motors almost perpetual youth is because it is *tougher*. It is resistant to most of the common causes of motor deterioration.

Fiberglas Electrical Insulation is *pure glass in fibrous form*. It can resist heat as high as 1000° F. It is not harmed by excessive moisture. Cannot rot. And is more stable in the face of most chemical corrosion than copper or iron. So what's the result?

Motors of 5 HP, for instance, *made with Fiberglas Insulation*, have easily withstood 7½ HP loads with safety. Why? Because Fiberglas Insulation can stand the added heat. But you haven't heard anything yet.

Leading electrical manufacturers are turning out motors and generators with Fiberglas Insulation, that are smashing all records for rugged performance.

And now the best news of all! Fiberglas has saved its modest cost many times over because it cut repairs, increased life, and reduced "down time."

Prove It Yourself

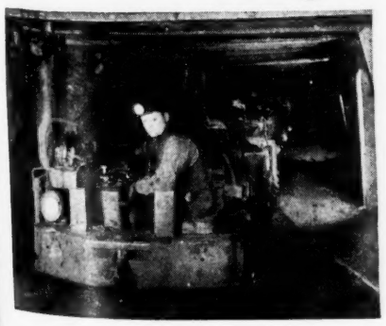
Don't take all this on our say-so. Make an actual test in your own business. Next time you have a repair job, or order a new piece of equipment, specify Fiberglas Insulation. From then on, let the *facts* do the talking. It's 10 to 1 they'll say: Standardize on Fiberglas Insulation.

OWENS-CORNING

FIBERGLAS

*T. M. Reg. U. S. Pat. Off.

Mining Co. Cuts Cost with Fiberglas Insulation



THE PROBLEM: A mining company in Pennsylvania has 400 motors of all sizes, operating under conditions of high relative humidity and subject to frequent overload. Motors fail after a few months because insulation, subjected to moisture and heat, deteriorates and burns out. How can this be prevented?

THE ANSWER: Chief Engineer orders test motors wound with Fiberglas Insulation from an electric motor manufacturing company. Finds motor life increased *three* and *four* times. Specifies all electrical equipment be 100% Fiberglas Insulated. Cuts maintenance cost and reduces "down time."

MORAL: A motor or generator is only as good as its insulation. Be sure to specify FIBERGLAS Insulation. Ask your Electrical Repair Shop or Manufacturer.

Union Convention Gives Officers Free Hand On Economic and Political Fronts

APPROVAL of all recommendations of its international officers and a free hand for its executive board on the political and economic fronts were given by the golden jubilee convention of the United Mine Workers at Columbus, Ohio, Jan. 23-Feb. 1. Several hundred suggestions and recommendations on bituminous wage-agreement questions embodied in local-union resolutions were merged into one substitute resolution which directed the wage-scale committee "to negotiate the best contract obtainable through the medium of a national, Appalachian or other proper joint-scale conference" in 1941. All anthracite wage-scale resolutions were referred to the anthracite tri-district convention to be held shortly before the expiration of the hard-coal contract next year.

District autonomy—a subject of extended, and even bitter, debate in past conventions—was removed from the arena of prolonged discussion by reaffirmation of the policy adopted in 1938. Under that policy, decision as to whether a district deprived of autonomy should have self-government restored rests with the international executive board. The greatest threat of division that developed was on the question of a convention indorsement of a third term for President Roosevelt; here the Lewis administration forces won their fight to avoid any commitment and to leave determination of future political action to the executive board.

The star part played by the United Mine Workers in promoting and supporting the Congress of Industrial Organizations was dramatized in addresses by key men in C.I.O. and by the presentation of commemorative plaques to Mr. Lewis. John Dunn, president, Columbus C.I.O. Council, started the ball rolling in a welcoming address at the opening session. He was followed at later sessions by Michael J. Quill, president, Transport Workers' International Union; James Carey, president, United Electrical and Radio Workers' International Union, and secretary of C.I.O.; R. J. Thomas, president, United Automobile Workers, and vice-president, C.I.O.; S. H. Dalrymple, president, United Rubber Workers; Sidney Hillman, president, Amalgamated Clothing Workers, and also C.I.O. vice-president, and John Phillips, president, Pennsylvania State Industrial Council. How vital the assistance and inspiration of the miners' organization had been was the theme sounded again and again.

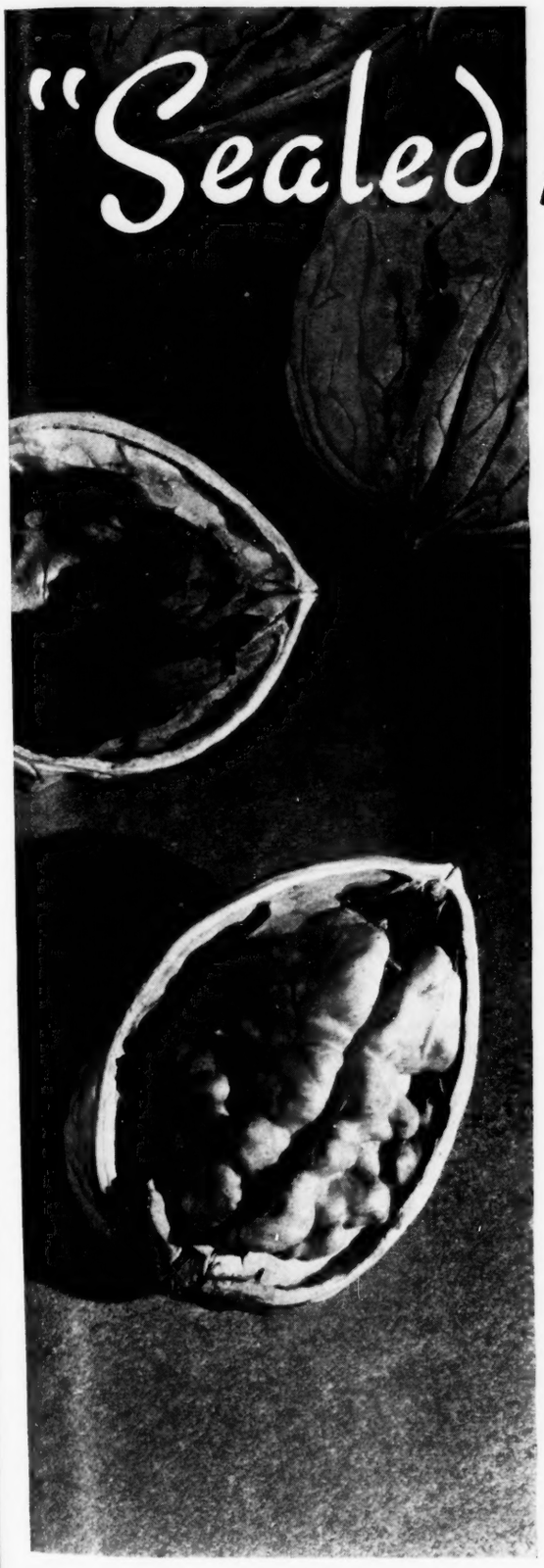
Scale Committee Report

Presentation of the scale committee report was made the closing day of the convention. This report sets up a national bituminous agreement as the objective of the 1941 negotiations. If that cannot be achieved, "then the procedure with reference to the convening of an Appalachian joint wage-scale meeting shall be followed." The report also provides for the establishment of a national policy committee composed of the international officers, international executive board, three executive officers from each bituminous district and district wage-scale committee members. Personnel of the wage-scale committee is to consist of the international executive officers, three executive officers from each district and 42 district committeemen. The number of committeemen allotted to each district is as follows:

District 2 (central Pennsylvania), 4; District 3 (western Pennsylvania), 2; District 4 (western Pennsylvania), 2; District 5 (western Pennsylvania), 4; District 6 (Ohio), 4; District 16 (Maryland), 2; District 17 (southern West Virginia), 7; District 19 (Tennessee), 3; District 20 (Alabama), 3; District 23 (western Kentucky), 2; District 24 (Michigan), 1; District 28 (Virginia), 2; District 30 (eastern Kentucky), 3; District 31 (northern West Virginia), 3.

"Other bituminous districts," continues the report, "may designate wage-scale committeemen on the same basis as the aforementioned Appalachian districts in the event a national wage-scale conference is arranged. In the event a joint Appalachian wage-scale conference is finally arranged, other district executive officers and wage-scale committeemen, whose districts are not included in the basic wage-scale conference, may attend meetings of the United Mine Workers scale and policy committee."

As to specific demands, the report says:



"Sealed Protection"

DUSTPROOFS FUEL

PROTECTS CONSUMERS

PRODUCES SALES!

As nature protects the kernel with the shell—so COALKOTE'S "Sealed Protection" protects your fuel from the mine to consumer.

"Sealed Protection" envelopes the fuel with a long-lasting protective, non-corrosive film that effectively seals dust particles to larger pieces of fuel . . . reduces dirt and smudge . . . and increases consumer acceptance.

Spray COALKOTE on your coal, coke or briquettes . . . dustproof your fuels . . . protect your customers . . . produce new sales. Write for complete information on "Sealed Protection".

SUN OIL COMPANY
PHILADELPHIA

SUN OILS

"COALKOTE"

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

The United Mine Workers scale committee shall endeavor to establish a uniform 6-hour day and 30-hour, 5-day week.

The wage scale committee shall also propose and endeavor to secure overtime at the rate of time and one-half for all work done in excess of 6 hours in any one day, or 30 hours in any 5-day week, with double time for Sundays and holidays.

The wage scale committee shall also endeavor to secure the abolition of all discriminatory differentials in and between districts.

Recognizing the need of improvement in local conditions of employment, the national wage-scale committee shall endeavor to have such matters satisfactorily adjusted through the medium of (1) the basic wage-scale conference or (2) have all such matters referred to the respective districts.

It is recognized that there should be established within regions, uniformity of wage rates for all work performed in mechanized units, with the distinct understanding that consideration will be given to the establishment of proper differentials between the various classifications of labor.

The inability of your wage-scale committee to foresee economic conditions in March, 1941, makes necessary a recommendation to this convention that no action be taken upon specified wage increases, other than a formal declaration to the effect that our people are entitled to higher wages and improved conditions of employment, and that the wage-scale committee be governed accordingly.

All wage-scale resolutions submitted to this convention on these and other wage-scale subjects and which may be sent to the international office prior to March 11, 1941, are referred to the wage-scale committee as a guide for the presentation of all wage-scale proposals to be presented to the bituminous coal operators in the joint wage conference scheduled to begin its sessions on March 11, 1941.

The wage-scale committee is hereby instructed to negotiate the best contract obtainable through the medium of a national, Appalachian or other proper joint wage-scale conference.

Nation-wide Contract Urged

In explaining the report of the scale committee to the delegates, Philip Murray, vice-president of the union, stated that a national agreement covering all the bituminous operations in the country had been the ambition of the United Mine Workers for many, many years. If such an agreement is unobtainable, he added, then the Appalachian contract again will be the basic agreement for the industry. With new negotiations more than a year away and the economic situation so uncertain, it would be unwise to attempt to set up any specific wage demands at this time. Although the present agreement provides for a joint commission on mechanization, the operators, declared Mr. Murray, have not been very cooperative with the miners in the work of this commission. As a result, he said, it has been impossible to establish uniform rates as between districts.

James D. Cole, delegate from the Nemacolin (Pa.) local, complained of the difficulties in working out check-off arrangements with captive mines. The first job is to organize such mines 100 per cent, counseled Joe Somargo, Fairmont, W. Va. Lack of organization also was assailed by Michael G. Hrezo, New Salem, Pa., who charged that only 2,000 of the 11,000 Frick miners in District 4 were members of the United Mine Workers. This was conceded by District President William Hynes, who insisted, however, that the union was laboring diligently to correct that situation.

Local unions submitted 265 resolutions which were referred to the scale committee. Many of these resolutions, however, covered

more than one subject so that actually they included approximately 1,140 suggestions and recommendations on all phases of contract negotiations. Changes in the basis of payment for impurities, including many demands that all impurities be paid for, were the subject of 82 recommendations; seniority rights were involved in 55; payment of compensation to tonnage men when deprived of work through no fault of their own was asked in 43 resolutions; the 6-hour day was demanded in 44 and vacations with pay in 32 resolutions. Performance of work normally done by union men by supervisory employees on idle days was denounced in 22 resolutions.

Specific ideas as to wage increases voiced in local-union resolutions covered a wide range. Percentage suggestions ran from 15 to 25 per cent. One local asked a boost of $2 per day to all day men in mechanized mines; another was ready to accept 50c. In two cases an annual wage of $1,800 was specified. Abolition of car pushing was the subject of six resolutions, with suggestions in some cases that where the practice was continued there be a substantial increase in tonnage rates. Several resolutions called for increases in the rates paid helpers in mechanical mines, and for shotfirers and electricians.

Physical examinations and the establishment of age limits were attacked in 26 resolutions. Several asked that the union be given the right to select company doctors. Mandatory establishment of company bathhouses was demanded by eleven locals. Some condemnation of triple-shifting also was voiced and higher rates (15 per cent) for the night shift with time and one-half for the graveyard trick were suggested. Some unions asked for the waiver of house rents when the mine worked less than five days per month.

Resolutions Cover Wide Range

In addition to the action taken on proposals to tax coal-loading equipment, reciprocal trade agreements and the Neely-Keeler bill, summarized in the February issue, convention opinion on other major economic and legislative problems as voiced in resolutions adopted included:

Government Contracts—Called upon union officers to work for passage of H.R. 3331, forbidding government contract awards to companies violating the National Labor Relations act, and also called upon President Roosevelt "to issue immediately an executive order establishing guarantees of collective bargaining in government contracts."

Governor Holt (West Virginia)—Condemned Governor Holt for alleged inimical attitude during Appalachian suspension and charged that he "was prepared to call out the State troops for the purpose of destroying the United Mine Workers."

National Labor Relations Board—After charging that recent policies of the board have permitted craft unions to raid established industrial unions, have broken down multi-plant employer units, have established proof requirements that "prevent the effective elimination of company unions in many obvious cases" and that the board in recent months has become anti-C.I.O. and pro-A.F.L., the convention condemned the pol-

icies of the board which "undermine the basic purposes of the act to strengthen organized labor and advance the practices of collective bargaining," administrative policies which result in the replacement of unbiased personnel with employees hostile to C.I.O. The Smith committee of the House of Representatives also was branded as "trying to find some way to emasculate or rape" the Wagner act.

Public Health—Affirmed support for the immediate adoption of federal health-insurance program to provide free medical care for low-income groups, cash benefits for temporary disability to workers and construction of needed hospitals in rural and urban areas throughout the country.

Social Security—Urged support to C.I.O. old-age program calling for pension of $60 per month at 60 years of age to individuals and $90 for married couples, and for the enactment of the Wagner health bill.

Demand Unemployment Parley

Unemployment — Called upon President Roosevelt "to convene a conference under government auspices of the leaders of labor, business, agriculture and government, whose duty it shall be in the interest of our government and the protection of our democratic institutions to work diligently in an attempt to effectuate a constructive national program designed to cure the evil of unemployment."

Unemployment Compensation—Called for increase in unemployment compensation benefits and simplification of laws through "the establishment of a uniform national unemployment compensation system on a federal basis."

Wage-Hour Law—Went on record urging raising of minimum standards "without compromise on the issue of wage differentials," and adequate appropriations to insure proper enforcement of act; condemned the Wage-Hour Administration on the score of inefficiency for failure to set up industry committees and enforce provisions of act; opposed "weakening" amendments and demanded hearings on all proposed amendments before any action is taken.

War—Demanded that the United States be kept out of foreign wars, but declared, "it shall ever be our purpose as Americans to defend our country and our free institutions against foreign invasion." Corollary to this, the convention also went on record opposing government aid to Finland while expressing sympathy with the plight of that and all other countries attacked by totalitarian states.

Workmen's Compensation—Asked for increased benefits and liberalization of existing statutes with extension to include occupational diseases not now covered, with insurance under State fund method in place of private companies "as the only sound way of furnishing assured protection."

The fight to prevent the convention indorsing President Roosevelt for a third term was won only after adroit planning and shrewd stage management. Forty-six of the 72 resolutions on political action submitted by local unions plumped for such indorsement. These resolutions came from locals in nine States; West Virginia was far in the lead with 28 local-union resolutions, Pennsylvania trailed with 6, Kentucky

and Virginia each reported 3, Ohio had 2, and Alabama, Maryland, Tennessee and Wyoming each contributed a single resolution.

Having condemned the conservative House group, alleged to be under the domination of Vice-President John N. Garner, in the officers' report, John L. Lewis, president of the United Mine Workers, lost no time in opening the attack on the New Deal wing. Paul McNutt was castigated for using troops to protect strikebreakers during his Indiana governorship (*Coal Age*, February, 1940, p. 104) in Mr. Lewis' remarks at the first session. The next morning, Mr. Lewis asserted that the Democratic Party was "in default to the American people." After seven years, he charged, it was still without solution "for the major questions of unemployment, low national income, mounting internal debt, increasing direct and consumer taxation and restricted foreign markets." President Roosevelt, if renominated, Mr. Lewis added, would go down in "ignominious defeat."

A drumfire on inaction on the unemployment situation continued throughout the convention. This was stressed as one of the greatest delinquencies of the New Deal. During the course of this attack, in which brother officers joined, President Lewis also paid his sarcastic respects to Secretary of Labor Perkins, who, he said, might make "an excellent housekeeper," but "knows as much about economics or the problems affecting this country as a Hottentot does about the moral law." General Hugh Johnson, one of the guest speakers, supported the Lewis program by declaring that it was good strategy to keep both political parties guessing. When organized labor, he said, ties itself to the chariot wheel of any political party or leader "it loses its bargaining power."

The substitute committee resolution on political action was presented to the convention on Jan. 31. It was adopted after considerable debate, according to the chairman (President Lewis), "by an overwhelming majority."

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Panther Creek No. 4 Reopened

The Midwest cold wave prompted the decision by officials of the Panther Creek Coal Co. to reopen the company's No. 4 mine, Springfield, Ill., at the end of January. About 450 men were to be employed. The operation had been closed since May 16.

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Mallory Tipple Razed by Fire

Fire late in January destroyed the tipple at Nos. 1 and 3 mines of the Mallory Coal Co., Mallory, W. Va. The loss was approximately $100,000, according to G. J. Stollings, vice-president and general manager.

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Cameron Colliery Reopened

Cameron colliery of the Susquehanna Collieries Co., which was operated for some time by the Stevens Coal Co., was reopened by the Susquehanna company on Feb. 5. Operations were resumed with 600 men at work, but the number will be increased.

Education, Research and Operating Problems Themes at Lowther Institute Meeting

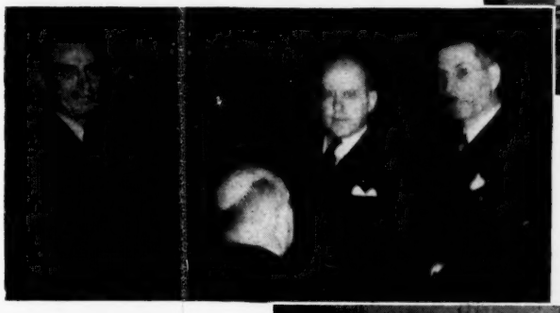
LEADING OFF with adult education, speakers at the 1940 meeting of the Thomas S. Lowther Mining Institute, held at the Indiana (Pa.) High School Auditorium Jan. 27, discussed also rubber-tired haulage, research and "radio" communication for coal mines. A dinner at the Methodist Episcopal Church followed the technical session and was featured by color movies of the North-Central Safety Day and First-Aid Meet. Members also paused to pay their respects to Thomas S. Lowther, retired mine inspector, for whom the institute is named, who was unable to attend the 1940 meeting because of illness.

Terming it a weapon in the economic struggle, Edward Steidle, dean, School of Mineral Industries, Pennsylvania State College, pointed out that adult education must be more than handing down established truths without regard to the student's previous knowledge or social qualifications. Youthful education, he declared, is not a vaccination against ignorance which makes one immune for life. Also, literacy is not merely ability to read and write but should include thinking and keeping abreast of the times.

The need for more adult education grows out of changing times. Of the matters in the newspapers ten years ago, only farm relief and the Mexican question now concern the public. And while adult education is not new, people now are beginning to think

Awaiting the bell
H. J. Rose, Edward Steidle, George L. Smith and W. B. Wardrop settle down to serious listening

"Come to order, please"
George J. Steinheiser opened the meeting



Intermission confab
D. R. Mitchell, A. S. Knoizen, T. F. McCarthy and Eddie Phillips talk things over

Seeing is believing
H. J. Rose explains while Edward Steidle, Carl Anderson, Robert Bone, William Brown and James Walker look over research products

Operation explained
Jack Lavoskey hears about "radio" communication from W. J. Schuster

Institute Leaders

George J. Steinheiser, 25th bituminous district inspector, was reelected president of the Thomas S. Lowther Mining Institute at the Jan. 27 meeting in Indiana, Pa. Other officers also were returned as follows: vice-president, W. B. Wardrop, inspector, 30th district; treasurer, Thomas S. Lowther, retired inspector; secretary, C. E. Wassam, Clearfield Bituminous Coal Corporation; assistant secretary, R. J. Craig, Rochester & Pittsburgh Coal Co.

E. E. Wishinger and Fred E. Bass were added to the executive committee, and the other members (T. D. Thomas, George L. Smith, George Plant, George Lindsay, L. W. Householder, T. F. McCarthy, F. R. Vinton, Thomas Adams, Morris Coulter, R. W. Sterrett, Amandus Olson, L. J. Redding and Thomas Gatehouse) were reelected.

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more about it because it is becoming more necessary as a result of faster changes in industry and the more complicated social relations of today. Education should not end with high school. Provision should be made for continued study in adulthood.

Of the 75,000,000 men and women of voting age in the United States, 32,000,000 have finished grammar school, 9,000,000 have finished high school and only 2,000,000 have gone through college. By 1960, there will be twice as many people over 45 as in 1930, increasing the problem of the educational institutions. At present, some 250,000 students are enrolled in extension classes, not including those receiving some form of adult education through home study, service clubs (such as the Kiwanis), the U. S. Bureau of Mines, etc.

Agencies seriously engaged in adult education include lyceums, chautauquas, service clubs, churches, Federal and State safety and health agencies, schools, etc. Objectives are to make the student a better citizen, a safer and more efficient worker or both. In Pennsylvania, the idea is to carry the college to the student by means of extension classes and correspondence courses. The Mineral Industries Extension program has been in existence since 1893. About ten years ago, the courses were completely reorganized with the idea of encouraging students to continue home work, study and reading following graduation. Now, it is the opinion that men should enroll for three years, starting with the fundamentals and finishing up with specialized subjects in their line of work. At present, 129 classes are held in 97 class centers in 32 counties in Pennsylvania, with 2,000 of the 4,000 enrolled engaged in coal mining.

With the loading equipment now available, operators of seams as thin as 30 to 40 in. have just as good a chance at getting low costs as the man with a 6-ft. seam, declared A. S. Knoizen, sales manager, Joy Mfg. Co. But, in making this possible, the equipment manufacturer was faced with providing first a low, compact and just-as-powerful loading machine and next a secondary transportation method functioning with equal efficiency.

Secondary transportation first was

attacked by conveyors in high coal. Next, the thought was to reduce the height and capacity of conveying equipment, but this still left it unsuited to many mines, in addition to the disadvantages of moving expense, moving time required and possibility of the loss of equipment. So development of the low-vein rubber-tired shuttle car was started, even though it is not the answer in all cases. In other words, depending upon conditions, mine cars and track, conveyors and rubber-tired equipment each have a place.

In addition to 5- to 6-ft. coal, shuttle cars have proved, declared Mr. Knoizen, that they can double the tonnage per man in seams as thick as 14 ft. and as thin as 36 in. The big problem is educating management in concentration of supervision, which spells success or failure in 90 per cent of the mines. To get 5 to 6 tons per man in a highly concentrated fast-moving mechanical operation, the boss must be able to think for his crew, regardless of the number of men, to get them to perform each task uniformly and in the best possible manner.

The possibilities of concentrated effort in supervision are shown by the fact that in coal as low as 36 in. a machine can average 250 to 275 tons per shift with rubber-tired haulage. In southern West Virginia, ten men, in the last five months, averaged 376 tons per shift in 40-in. coal. The large economies possible with mechanical loaders therefore grow out of concentration of working places and better supervision. By getting men close together it is possible to watch them and think for them. In one mine, the result is a production of 50 tons per man per shift to the parting and 22 tons per man to the railroad car.

Mechanization Cuts Costs

Cheap-coal competition is growing, said Mr. Knoizen, because more operators are adopting mechanization, which results in face costs of as low as 11c. per ton, many around 18c. and several dozen at 22c. Such costs signify that somebody is applying the principles of modern industrial engineering to mining. Recently, large shuttle cars were installed in a northern West Virginia mine which previously, with track, had been averaging 260 tons per machine shift with 12-man crews in 12-ft. headings. With the same crew in the same territory and using shuttle cars, average output per machine shift is 500 tons.

When face costs of $0.93 to $1.15 in various seams in various localities can be reduced, conservatively, to 20 to 28c., somebody is using industrial engineering principles to the best advantage, contended Mr. Knoizen in stating that, after all, coal companies are in business to make money out of handling a raw material in bulk. To make money, it is necessary to get a low cost and thus meet competition either from substitutes or other low-cost coal. That is the problem that mechanization is trying to solve. Rubber-tired haulage plays its part in eliminating waste in tracklaying, as well as the delays and congestion incidental to track operation, and increasing the efficiency of the loading machine and crew members by making mining more continuous.

With a new chemical compound being brought out every 20 minutes and a new invention being patented every 3½ minutes, it truly can be said that research and invention are remaking the world, declared H. J. Rose, senior industrial fellow, Mellon Institute of Industrial Research. Research, he continued, really is only a point of view. The successful man bends his efforts to finding facts and still more facts, which he then applies to the development of new uses. Scientific research, therefore, becomes "orderly thinking and experimentation by well-informed and intellectually honest persons." As an example, Dr. Rose cited a new hardening process for glass, in which the known facts that glass is strong in compression but weak in tension were used to perfect a hardening system that puts the entire glass surface under sufficient compression that it is difficult to bend it far enough to cause tension and thus breakage.

Recent research products include fiber glass, now used in a modified form of the "Orange Wax Clover Fuse" developed by Mellon Institute. In the modification, the core yarn is made of fiber glass, which will not burn. Smoke, therefore, is reduced. Other explosives products resulting from research are "Primacord" detonating fuse, the new pull-type self-igniting fuse and a cartridge with a rubber cap which permits igniting as many as six fuses at once.

Research in utilization of waste materials has resulted in the manufacture of such materials as buttons, combs, woolen yarn and the like from skimmed milk, and Prestone, rods and tubing, plastic sheets, acid-proof thread, lacquer for lining beer cans, plastic fillers for safety glass, etc., from natural gas. Stating that while many products are in effect "substitutes," Dr. Rose made the point that they are not necessarily inferior but in many cases are better than the materials they displace.

Coal ashes may be used for soil improvement or for production of tile (90 per cent household ashes and 10 per cent lime—compressed and cooked by steam), insulating and acoustic materials, etc. And from coal itself come such materials as "Neoprene," picnic plates, "Lucite," "Nylon" and other products. In other words, "What man can imagine, man can do" is the creed of the researcher.

Reporting on a new "radio" communication system for mine use, based on voice transmissions by means of high-frequency waves and employing the mine power circuits as transmission lines, W. J. Schuster, Safety Stemming Plug Sales Co., stated that development has reached a point where the system practically is the equivalent of true radio. Accompanying his remarks with a demonstration, Mr. Schuster pointed out that several mine installations were giving satisfactory service either in general communication or in communication between dispatchers and main-line locomotives.

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New Stoker Heat Campaign On

The Kansas City (Mo.) stoker coal heat campaign sponsored by the bituminous operators of Kansas, Missouri and Oklahoma in cooperation with the Kansas City Power & Light Co. opened its second year of activity with a full-page advertisement in

the Kansas City *Star* on Feb. 25 (see *Coal Age*, February, 1940, p. 85). It also was expected that advertising featuring individual stokers, coals, etc., would appear. Coincident with the opening of the drive, the Kansas City Better Homes Show started an eight-day run with ten or more leading stokers on display.

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Pond Creek-Tug River Institute Gets Going at Dinner Meeting

Ninety-six attended a dinner meeting of the newly organized Pond Creek-Tug River Mining Institute at the Mountaineer Hotel, Williamson, W. Va., Jan. 25. In line with the principal object of the new Institute, J. J. Forbes, supervising engineer, safety division, U. S. Bureau of Mines, outlined a series of recommendations for promoting safety. W. A. Eades, safety director, Eastern Coal Corporation, Stone, Ky., gave a detailed account of the work done at the Bartley explosion by the Stone rescue team.

Only Kentucky mines are included in the Pond Creek-Tug River institute and these mines are in the section across Tug River from Williamson and vicinity. Permanent headquarters and the regular meeting place is at Stone, in the old bank building. Regular meetings are night sessions, held each month, on the last Thursday. Present membership includes executives and officials from eleven coal-mining companies and all eleven were represented at the dinner, which was the third meeting held by the institute.

"A person trained in first aid," said Mr. Forbes in urging such training as a part of accident-prevention programs, "is less likely to be injured than a man who has not had first-aid training." In mine rescue, apparatus should be kept in good condition, which requires that a competent man be charged specifically with the responsibility. Rescue men should be retrained at least every two months to keep them conversant with the apparatus. For protection of crew members, the Bureau is insisting on higher physical qualifications before issuing mine-rescue certificates. Among other activities recommended were the Bureau's accident-prevention course and the use of well-planned safety meetings.

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Coal Division Hears Arguments; Control Act Upheld

Pausing in the preparation of recommended prices under the Guffey coal control act, trial examiners began hearing oral arguments Feb. 14 by parties who appeared before them in the final price hearing which closed on Jan. 20 after nearly six months' session. Consumers, individual producers and district boards were heard. The hearing was brought to a close on Feb. 16 with a statement from Presiding Examiner Thurlow G. Lewis that all briefs would be read carefully and that due consideration would be given to all oral arguments presented; that the examiners would endeavor to produce results that would be satisfactory to the producers and to the consuming public as well as being within the limits of the law.

On District Board No. 20—Utah—Alfred Carey, Cheyenne, Wyo., has been selected as the United Mine Workers' representative, vice John M. Ross, resigned.

In its annual report to Congress the Coal Division covers the activities of the former Commission for the fiscal year ending June 30 last, as well as the work of the Division since that date. The report analyzes the organizational changes incident to the work being taken over by the Interior Department, which resulted in annual savings of approximately $440,000.

The section of the report dealing with marketing agencies points out that at the time of filing the report, eleven agencies had been granted provisional approval. These had a combined membership of 184 code members out of a total code membership of over 12,600, or less than 1 per cent. The tonnage represented by these 184 members,

The Official Line-Up

Left to right, program chairman, C. J. Flippen, safety director, N. & W. Fuel Department; secretary-treasurer, W. E. Wheeler, senior inspector, Kentucky Department of Mines and Minerals; president, E. S. Hamilton, superintendent, Pond Creek colliery, N. & W.; vice-president, W. A. Eades, safety director, Eastern Coal Corporation.

however, was in excess of 20 per cent of the national total. The three agencies in operation prior to 1939 showed a loss in membership from 1937 to 1939: Alabama Coals, Inc., declined from 17 to 14; Appalachian Coals, Inc., 71 to 45; Smokeless Coal Corporation, 21 to 9. The only agency showing an increase in membership is the Kentucky Coal Agency, operating in western Kentucky.

Constitutionality of the National Bituminous Coal Act was upheld Feb. 16 at Little Rock, Ark., by a three-judge Federal Court. In a unanimous decision, the court dismissed a petition by the Sunshine Anthracite Coal Co., Clarksville, Ark., seeking a permanent injunction against collection of a 19.5 per cent tax on coal produced by the company, a non-code operator under the terms of the statute. The court continued a temporary injunction for 30 days to permit an appeal to the Supreme Court of the United States.

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Personal Notes

CHARLES E. DUNLAP, president, Berwind-White Coal Mining Co., New York City, has acceded to a request that he act as chairman, bituminous coal division, for the Finnish Relief Fund, of which former President Herbert Hoover is national chairman.

GEORGE P. FITZ, general manager, Ajax Coal Co., Hazard, Ky., was reelected president of the Hazard Coal Operators' Association at its annual meeting. Other officers renamed are: vice-president, D. T. PRITCHARD, general superintendent, Algoma Block Coal Co.; secretary, A. E. SILCOTT.

J. J. FORBES, supervising engineer, Safety Division, U. S. Bureau of Mines, Pittsburgh, Pa., has been appointed chairman for 1940 of the program committee, Mining Section, National Safety Council.

R. E. HOWE, president, Appalachian Coals, Inc., has accepted appointment as a member of the committee on principles of Americanism of the National Association of Manufacturers.

C. F. HUBER, chairman of the board, Glen Alden Coal Co.; was relected president of the Anthracite Institute at its annual meeting. Other officers renamed are: executive director, LOUIS C. MADEIRA 3d; treasurer, HARRY R. STANTON; director, bureau of information, NORMAN F. PATTON. Directors are: W. M. BURRUS, president, Penn Anthracite Collieries Co.; W. W. INGLIS, president, Glen Alden Coal Co.; F. W. LEAMY, senior vice-president, Hudson Coal Co.; DAVID LLOYD, president, Dial Rock and Green Ridge coal companies; JAMES PRENDERGAST, president, Susquehanna Collieries Co.; GORDON C. COOKE, president, D. L. & W. Coal Co.; HAROLD M. SMYTH, president, St. Clair Coal Co.; R. E. TAGGART, president, Philadelphia & Reading Coal & Iron Co.; J. B. WARRINER, president, Lehigh Navigation Coal Co.; L. R. CLOSE, president, Lehigh Valley Coal Sales Co., and MR. HUBER.

ANTHONY F. KANE has been appointed mine foreman at the Buttonwood colliery of the Glen Alden Coal Co., Wilkes-Barre, Pa.

E. C. MAHAN, president of the Southern

Coal & Coke Co. for 22 years, became chairman of the board on Feb. 1 and will continue in active management of the coal-selling company, which has headquarters in Cincinnati, Ohio, and mines in Tennessee and Kentucky. This is a newly created post. W. A. ELLISON, formerly vice-president, has been advanced to the presidency. The company was organizd in 1902 at Jellico, Tenn., and headquarters were moved to Cincinnati a year later.

SAMUEL D. RINGSDORF, Kingston, Pa., has been appointed executive secretary of the Anthracite Operators' Association.

WILLIAM M. SIMS has been appointed mine foreman in the Lewisburg mine of the Sloss-Sheffield Steel & Iron Co., Lewisburg, Ala. He had been employed in the operating department for some time before his promotion.

GRANT STAUFFER, president, Sinclair Coal Co., Kansas City, Mo., has been elected a Class A director of Bituminous Coal Research, Inc.

L. E. WOODS, president, Crystal Block Coal Co., was reelected president of the Coal Operators' Association of the Williamson Field at its annual meeting. Other officers named are: vice-president, C. A. HAMILL, president, Sycamore Coal Co.; treasurer, J. B. MCLAUGHLIN, general manager, Earlson Coal Co.; secretary, J. J. ARDIGO.

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Birmingham Names Group On Smoke Control

A committee to study Birmingham (Ala.) smoke problems and make recommendations for a campaign of education and smoke control was appointed late in January at a meeting sponsored by the City Commission. Various organizations are included in membership in the group, which includes James L. Davidson, secretary, Alabama Mining Institute.

Discussions by the committee thus far have looked toward city regulations covering new installations in homes and industries to the end that the heating plants meet specifications for elimination of smoke as far as possible. The city already has an ordinance regarding the density and quantity of smoke that will be tolerated in a given time, and sentiment seems to favor more rigid enforcement. In addition, a campaign of education is planned to convince the public of the wisdom and economy of installing stokers or of using a smokeless fuel.

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U.M.W. Wins Certification

The National Labor Relations Board has certified the United Mine Workers as bargaining agency for employees at the mines of the Williams Coal Co., Mannington, Ky., and the Newcoal Corporation, Madisonville, Ky. Elections ordered by the Board brought the following results: 107 for the U.M.W. to 72 for the Progressive Mine Workers at the Williams plant, and 35 to 32, respectively, at the Newcoal operation.

Harris & Ewing

F. G. Tryon

F. G. Tryon Victim of Pneumonia

Frederic G. Tryon, chief of the research section of the Bituminous Coal Division, U. S. Department of the Interior, died Feb. 15 at Sibley Hospital, Washington, D. C., of pneumonia. He was graduated from the University of Minnesota, did graduate work at Johns Hopkins, and in the World War was in charge of statistics on mineral raw materials for the War Industries Board. From 1919 to 1937 he was in charge of coal statistics for the Geological Survey and then the Bureau of Mines. Three years ago he became associated with what was then the Bituminous Coal Commission.

At various times he was associated as lecturer or staff member with the University of Pennsylvania, the Brookings Institution and the Twentieth Century Fund. He also was chief statistician and editor of a four-volume report of the U. S. Coal Commission, published in 1923, and was a collaborator in half a dozen works on fuel and power economics.

Howard A. Gray, director of the Coal Division, Interior Department, said that "beyond doubt, Mr. Tryon was one of the nation's best informed men on the coal industry. He had been prominently identified with practically every major government activity regarding bituminous coal for nearly a quarter of a century."

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Obituary

JOHN OTIS SMITH, 72, president of the Black Eagle Smokeless Coal Co., Mullens, W. Va., died Feb. 4 at his home in Corinne, W. Va. He was formerly superintendent of the Houston Collieries Co., in McDowell County, West Virginia, for twenty years. His son, John W. Smith, is vice-president of the Black Eagle company.

JOHN J. FASMER, 56, until a few months ago general sales manager of the Stephens-Adamson Mfg. Co., Aurora, Ill., died Feb. 3. He had been in active service with the firm from its organization in 1901—as superintendent of the factory at Aurora until 1919, as manager of the St. Louis sales

engineering office till 1931, and then as general sales manager.

ROBERT SMILLIE, 83, president of the Scottish Miners' Federation, died Feb. 16. Besides heading the Scottish union from 1894 to 1918 and since 1921 he was president of the Miners' Federation of Great Britain from 1912 to 1921 and was a Labor member of Parliament from 1923 to 1929.

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New Preparation Facilities

CEDAR GROVE COLLIERIES, INC., Cedar Grove, W. Va.: Contract closed with Kanawha Mfg. Co. for three-track steel tipple equipped with mine-run scraper conveyor, shaker screens for three grades, two loading booms, and egg conveyor; rail and river loading capacity, 150 tons per hour.

GLENDORA COAL CO., Mine No. 30, Sullivan, Ind.: Contract closed with Templeton-Matthews Corporation for new seven-track concrete and steel preparation plant with rotary car dump, slope belt conveyor, washing and drying equipment for 3x0-in. coal and hand-picking facilities for plus 3-in. sizes; there are to be crushing arrangements for picked lump and egg in addition to crushing and rescreening facilities for all washed sizes for preparation of maximum production of stoker coal; plant to be in operation about Oct. 1.

GLENDORA COAL CO., Peerless mine, Sullivan, Ind.: Contract closed with Templeton-Matthews Corporation for domestic stoker-coal facilities consisting of vibrating screens, conveyors, oil-treatment equipment, and steel structure to handle 2x0 or 1½x0-in. coal at rate of 200 tons per hour for preparation of 1-in. x 10-mesh stoker coal.

KELLEYS CREEK COLLIERY CO., Maidsville, W. Va.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Norton automatic washery unit to treat 5x0-in. coal; capacity, 60 tons per hour; addition to existing equipment; to be completed about April 1.

OAKWOOD SMOKELESS COAL CORPORATION, Oakwood mine, Oakwood, Va.: Contract closed with Kanawha Mfg. Co. for three chloride washers for stove (3x1¼ in.), 50 tons per hour; nut (1¼x¾ in.), 40 tons per hour; and pea (¾x¼ in.), 40 tons per hour.

In the tabulation of preparation facilities installed in 1939, p. 71, February *Coal Age*, the line denoting two installations of McNally-Pittsburg equipment by the Truax-Traer Coal Co. at Elkville, Ill., gave the capacity, net tons of feed per hour, as 150. This should have read 600 tons.

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Rebuilding Cedar Grove Tipple

Reconstruction of the tipple at the Cedar Grove Collieries, Inc., Cedar Grove, W. Va., recently destroyed by fire, is under way. Contract for the new structure, which will be all steel, has been given the Kanawha Manufacturing Co., Charleston, W. Va., and work is to be completed some time in March. Shaker-screen capacity will be 50 per cent greater than in the old plant. The fire, which occurred Jan. 22, caused a loss of about $30,000 and threw 120 men out of work for about six weeks, according to Roger W. Tompkins, president of the company.

Big Sandy-Elkhorn Institute Views Year's Safety Work

Haulage was responsible for the greatest number of accidents (155) during 1939 at mines in the Big Sandy-Elkhorn field, according to a statistical report presented at the Jan. 28 dinner meeting of the Big Sandy-Elkhorn Coal Mining Institute, Hotel Hatcher, Pikeville, Ky. Falls at the face were responsible for the greatest number of falalities (nine). The 32 active mines listed produced 8,316,348 tons. The tonnage per accident was 8,981 and the tonnage per fatality 396,017. A. D. Sisk, institute secretary-treasurer, and safety director, Big Sandy-Elkhorn Coal Operators' Association, presided in the absence of the president C. L. Spradlin, general superintendent, South-East Coal Co., Seco. Icy mountain roads cut attendance.

J. J. Forbes, supervising engineer, safety division, U. S. Bureau of Mines, outlined recommendations of the Bureau for promoting safety, covering essentially the same points developed the evening before at the Williamson meeting of the Pond Creek-Tug River Mining Institute (p. 86). In addition, Mr. Forbes described the part that Bureau men have taken in rescue work following several mine explosions and drew on those experiences to point out lessons to be learned.

The Big Sandy-Elkhorn institute holds regular night meetings at Pikeville on the last Friday of each month unless that Friday happens to be the last day of the month, in which case the meeting date is advanced one week.

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Coal and Coke Consumed by WPA

Purchases of coal and other fuel except wood and petroleum for use on Works Progress Administration projects amounted to $3,682,000 from the beginning of the program in July, 1935, through September, 1939, according to figures just released. Local project sponsors and the Federal Government participated in the purchases, the WPA spending $2,163,000 and the local agencies $1,519,000 for coal and other fuel, mostly coke.

The production of coal and other fuels, other than wood and petroleum, to fill WPA orders required more than 7,300 man-hours of labor, the U. S. Bureau of Labor Statistics estimates. This does not take into account the additional labor required in the transportation industries to haul coal and coke from the mines to project sites throughout the 48 States.

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Estimates Bootleg Coal Output

There are 2,500 bootleg anthracite holes in operation, employing 9,000 men, with an average daily production of 19,000 tons, according to John Ira Thomas, Secretary of Mines for Pennsylvania. The figures are contained in a report covering eleven inspection districts in Dauphin, Northumberland, Columbia, Schuylkill, Luzerne and Carbon counties, issued by Secretary Thomas, who adds: "The coal is prepared for market by 337 breakers which vary in size from a shaker and a bin to a $60,000 construction employing 22 men. Approximately 1,353 truckers are employed in hauling the raw coal from the bootleg holes to the breakers. I estimated the production of bootleg coal for 1939 was between 3,500,000 and 4,000,000 tons—8 per cent of the entire anthracite production—and cost the lives of 58 miners."

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Funds to House Speed School

A $200,000 building to house the Speed Scientific School, University of Louisville, Louisville, Ky., was assured on Feb. 7 by gifts of $65,000 each by William S. Speed and Mrs. Frederic M. Sackett and a Works Progress Administration grant of $52,000. The building will be a memorial to the late James B. Speed, father of W. S. Speed, and Mrs. Sackett, all largely identified with coal interests in Harlan County, Kentucky. Organization of the Speed School was made possible by an endowment of $250,000 from James B. Speed in 1925.

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William C. Atwater Dies At Age of 78

William C. Atwater, 78, chairman of the board of the American Coal Co. of Allegany County and the Mill Creek Coal & Coke Co., West Virginia operating companies, as well as William C. Atwater & Co., distributor, died Feb. 22 at his winter home in St. Petersburg, Fla. Born in Brooklyn, N. Y., he was graduated from Amherst College, beginning his business career in 1886 as a coal salesman with Haddock, Shonk & Co. In the early nineties, he organized in Fall River, Mass., his own company, afterward known as William C. Atwater & Co. of Massachusetts.

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Industrial Notes

A. S. KNOIZEN, sales manager of the Joy Mfg. Co., Franklin, Pa., has been elected vice-president in charge of sales. Mr. Knoizen joined the Joy organization in 1922 and became sales manager in 1936.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has appointed H. P. Binder as assistant manager of its centrifugal pump division. He entered the hydraulic engineering department of the company in 1912.

JOHN A. ROEBLING'S SONS CO., Trenton, N. J., has named Edward D. Emerson as general manager of sales. Graduated in mechanical engineering from Harvard, he was for several years sales engineer with the Jones & Laughlin Steel Corporation, subsequently becoming New York district sales manager with the Babcock & Wilcox Tube Co.

COPPERWELD STEEL CO., Glassport, Pa., has made Sidney D. Williams vice-president and in charge of sales for the company's new steel division at Warren, Ohio. A metallurgical engineering graduate from Lehigh, he has been associated with the Carnegie

Steel Co., Central Iron & Steel Co. and Pittsburgh Crucible Steel Co.

TIDE WATER ASSOCIATED OIL CO. has set up a Southern branch for distribution of its products. The new office and warehouse are in Charlotte, N. C., with R. H. Mariner as regional manager.

LINN MFG. CORPORATION, Morris, N. Y., manufacturer of tractors, has elected E. D. Herrick as president. During most of the last twenty years he has been with the Lycoming Mfg. Co. as chief engineer, assistant general manager and president.

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J., announces that hereafter its subsidiary the Moore Steam Turbine Corporation, Wellsville, N. Y., will be conducted as the Moore Steam Turbine Division of the corporation.

BROWN-FAYRO CO., Johnstown, Pa., announces that Marck C. Simpson has joined its sales force to cover western Pennsylvania, eastern Ohio and northern West Virginia.

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Trade Literature

BATTERIES—Gould Storage Battery Corporation, Depew, N. Y. Bulletins 1000, 1200 and 1500 describe and picture sealed-in-glass units for a variety of applications, showing assemblies, specifications, etc.

BATTERY CHARGER—General Electric Co., Schenectady, N. Y. Bulletin GEA-3179A gives general characteristics and advantages of the CR7 501-K Phano-charger with diagrams and characteristic data.

BEARINGS—Koppers Co. (Bartlett Hayward Division), Baltimore, Md. Booklet describes the new multiple oil-film bearing designed by Gustave Fast; also outlines the history of bearings, discusses the principle and design of the Fast unit, provides tables of dimensions and load capacities, dimensions of standard bearing housings, recommended shaft sizes, dimensions of locknuts, and proper oil levels.

CABLES—Anaconda Wire & Cable Co., New York City. Publication C-46 covers wire and cable for mine applications, including trolley wire, bare copper wire, bare concentric lay cable, weathering wire and cable, weatherproof wire and cable, heat-resisting wire and cable, portable mining-machine and trailing cables, arc-welding cable, shotfiring cords, telephone wire and cable, non-metallic armored cable, shaft or borehole cable, etc.

CONVEYORS—Link-Belt Co., Chicago. Book 1700 is a picture book of many different applications of mechanical elevating and conveying equipment for handling both packaged and loose bulk materials; several pages of statistics are included.

CREEP STRESS DATA—Babcock & Wilcox Tube Co., Beaver Falls, Pa. Technical Data Card No. 4 gives relative creep stress data on Croloys 2 and 2¼ and other materials in the same range in the high-temperature tubing field. The data are arranged in the form of a chart observable at a glance.

ENGINEERING AIDS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Booklet B6057 is a

directory of engineering literature listing more than 350 bulletins, including 280 items on power, electrical and industrial machines produced by the company; about 40 instruction books and repair-part bulletins, and 38 catalogs and folders on tractors, farm equipment and road machinery.

EXPLOSIVES—Atlas Powder Co., Wilmington, Del. Catalog gives complete information about the company's entire list of explosives. Products available for specialized fields are grouped for ready reference, with description of the properties of each explosive. Included are specifications on blasting caps, electric blasting caps, delay electric blasting caps, electric squibs, blasting machines, rheostats, galvanometers and fuse.

GASKETLESS TERMINALS—General Cable Corporation, New York City. Folder describes Type SS streamlined soldered porcelain terminals designed to be vacuum- and pressure-tight in service, even under abnormal temperature and pressure conditions. Sectional views show construction and specifications are given.

HOSE—Mechanical Goods Division, United States Rubber Co., New York City. Form M9333, "Hose Hints," is designed to help users get more service out of various types of hose and to help select the correct type for specific purposes. It contains useful tables, illustrates various kinds of hose construction, lists hose terms, and explains methods of manufacture and tests.

MINE-TRACK EQUIPMENT—Bethlehem Steel Co., Bethlehem, Pa. Booklet 72-A contains a wealth of material on its complete line of mine and industrial track equipment, to a large extent improved and redesigned to meet the requirements of new and heavier rolling stock. The book contains much tabular data and is profusely illustrated.

MOTOR-TRUCK SCALES—Toledo Scale Co., Toledo, Ohio. Folder Form 2415 contains timely suggestions concerning motor-truck scales and National Bureau of Standards regulations. Included are illustrations of the mechanical features of representative models in the company's three new lines.

ROLLER CHAIN—Morse Chain Co., Ithaca, N. Y. Bulletin R-54 contains detailed information on construction, capacities and applications of Morse roller chain. Included are power-transmission capacity tables for pitches from $\frac{3}{8}$ to $2\frac{1}{2}$ in., a guide for calculation of chain lengths, tables showing sprocket dimensions and types, sections showing proper chain-drive layout, discussion of types of oiling systems, etc.

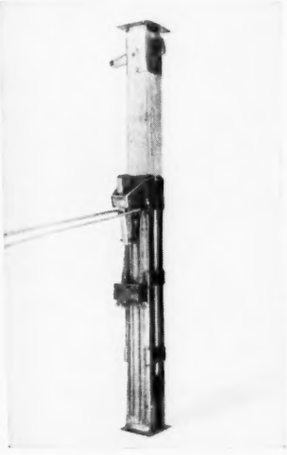
TRANSFORMERS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B6043 describes and pictures Chlorextol transformers, stressing their salient features and advantages.

WIRE-ROPE SLINGS—Macwhyte Co., Kenosha, Wis. Handbook contains information on sling designs, capacity and weight comparisons of slings, wire rope and chain; tables on safe working loads; typical assemblies; crane signals; breaking strength and weight comparisons. Many reference tables and illustrations are included.

WHAT'S NEW IN COAL-MINING EQUIPMENT

ADJUSTABLE PROP

The Markham adjustable safety mine prop, said to insure safety, speed and economy in mine timbering, is offered by the Markham Products Co., Birmingham, Ala. This prop consists essentially of a steel-channel base carrying a locking dog and wedge. In use, a square timber, which fits in the base, is raised against the roof and locked in place by drawing the wedge to tighten the the dog. An automatic "cap board," pivoted to insure full contact against slanting or uneven roof and with holes for attaching wooden boards for cushioning or greater bearing



surface, may be used on top of the timber. The cap board includes a wedge for tightening the prop.

To take down the prop, the dog wedge is driven up, or, if it is necessary to remove the prop from a distance, a knock-out block (see illustration) operated by ropes may be used to loosen the wedge. Afterward, the same ropes may be used to pull the prop out of the danger zone. A "raising lever," which permits using the prop as a jack in raising bars or other heavy loads, also is available.

In addition to roof support, the prop also is offered for holding down or anchoring shaker drives, pumps, motors, pipe lines and the like. The standard prop is manufactured with bases 5 ft. or less in length and for 4x4-in. timbers, although 6-in. bases may be obtained. Any length timbers may be used with any length bases, but the company recommends that bases be approximately 1 ft. less than roof height. And for special conditions, the cap board may be placed on the bottom. Average setting time, the company states, is 10 to 15 seconds. The 4x4-in. unit, under test, has carried 8 to 10 tons; 6x6, 20 tons, depending on the timber used.

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TRACTOR

A tractor—the Model "S"—designed expressly to take advantage of the extra power in the high-octane (67–72) gasolines now available is announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. According to the manufacturer, this unit gives increased power with low fuel consumption because its higher compression engine has been engineered to squeeze the last ounce of power from a stepped-up fuel. The "Super-Seal" rollers run on roller bearings and need be lubricated only once every 200 hours.

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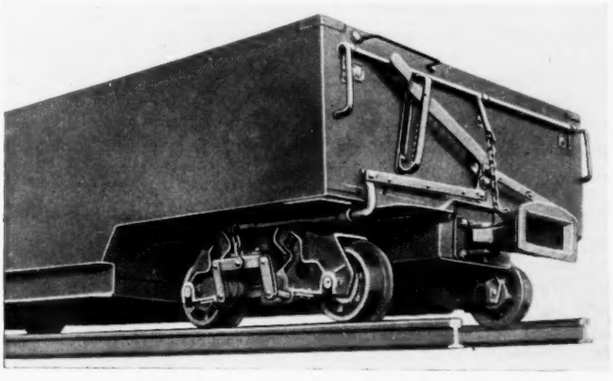
LARGE-CAPACITY MINE CAR

American Car & Foundry Co., New York City, offers a mine car of large capacity designed to roll easily, pass around curves with minimum friction, and stay on the track. The unit pictured is of 10 tons capacity, which can be increased if required. It has double-knee-action swivel trucks and the load is carried on eight ACF chilled-tread wheels; horizontal springs are compressed through the movement of the trucks to absorb vertical shocks. Equipment includes brake, automatic couplers and anti-friction bearings. The body is electrically welded throughout.



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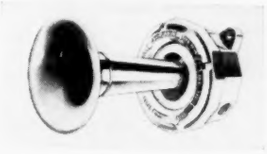
SIGNAL SYSTEM

A more efficient signal system with lower installation and maintenance cost is the announced aim of the Benjamin Electric Mfg. Co., Des Plaines, Ill., in introducing a completely new line of howlers for industrial signal use. According to the manufacturer, outstanding improvements in the Benjamin Howler con-



cern tone, volume and simplified assembly which permits the operating unit to be quickly installed, serviced or replaced. Greater sound penetration is effected by increasing the sound volume of the unit 100 per cent and engineering a distinctive tone that gives greater audibility.

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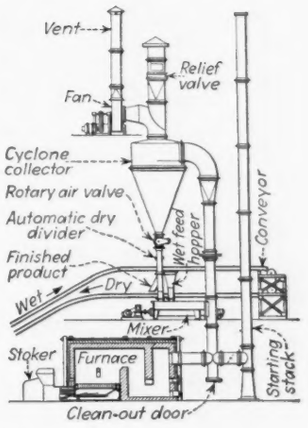
SMALL-COAL DRYER

To dry the smaller sizes of coal to facilitate handling during all seasons and to prevent freezing in winter, Raymond



Pulverizer Division, Combustion Engineering Co., Chicago, has developed the C-E Raymond flash-drying system. Suited for $\frac{1}{8}$-in. coal and under, the system consists of a furnace for supplying hot gases and a drying unit composed of a wet feed hopper, mixer, air piping, cyclone collector, fan and automatic dry divider.

The specially designed furnace is normally fired with an automatic stoker, and has a variable-speed arrangement which when once set will not require attention for several hours. It may be equipped for semi-automatic control, insuring a constant gas temperature within certain limits.

In the drying unit, the hot gas is drawn into the system by the action of a fan connected to the cyclone collector vent, the coal to be dried being continuously introduced into the hot gas stream by the mixer. It is necessary, however, that the finer sizes be conditioned before entering the hot gas stream; this requires that a small portion of previously dried coal be returned and mixed with incoming wet feed. A large surface for evaporation of moisture is provided and lumping of the coal is prevented. An automatic dry divider is incorporated so that the proper quantity of dry coal is continuously added to the incoming wet feed. The dried coal and moisture-laden gas are drawn into the cyclone collector, the coal dropping to the bottom of the collector and moisture-laden gases being discharged by

the fan to the atmosphere. The bottom of the cyclone collector is equipped with a rotary air valve to discharge the dry coal and prevent infiltration of air.

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DRINKING FOUNTAIN

Its portable drinking fountain is the answer to the problem of supplying clean, cool drinking water to transient crews of workmen, according to Dobbins Mfg. Co., North St. Paul, Minn., the manufacturer. Water placed in this insulated fountain at 50 deg. F. will rise less than 10 deg. in ten hours even if subjected to a constant outside temperature of 90 deg.

The flow is supplied through a tilting type of bubbler operated by a slight thumb pressure. A stainless-steel guard around the bubbler affords sanitary protection for the user. A built-in valve keeps the water flow constant at all times. Four gallons is a standard capacity fountain, which weighs 22 lb., is 8⅝ in. in diameter, and has an over-all height of 27 in.

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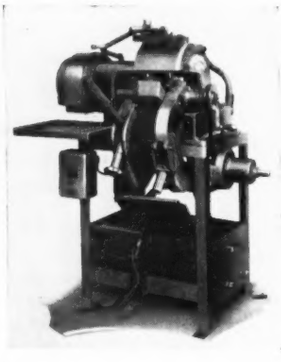
JACKBIT GRINDER; COMPRESSORS

A new non-automatic jackbit grinder announced by Ingersoll-Rand Co., Phillipsburg, N. J., is adaptable for use with all types of standard detachable rock-drill bits used by mines, contractors, etc. Known as the size J-3, it has a capacity of 35 hard bits or 50 annealed bits per hour and is available for electric, air, gasoline-engine or belt drive.



I.-R. also offers a new line of industrial compressors and vacuum pumps from ¾ through

5 hp. Embodying a simplified "finger valve" construction, these new compressors form only a part of the complete range of Type 30 units, which are built in sizes up to 15 hp. for pressures as high as 1,000 lb. They are available with or without drive, receiver-mounted or bare.

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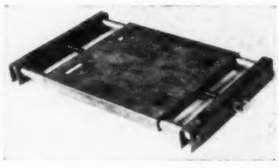
MOTOR BASE

A new motor base, called the "Automatic," designed to maintain correct belt tension automatically through the action of special steel springs is offered by Ideal Commutator Dresser Co., Sycamore, Ill. This design —especially suited to short center drives—can be used for all types of drives: horizontal, vertical or overhead.

To take up slack in belts from normal wear and stretch, says the maker, it is necessary only to give the adjusting screw a few turns and the base



moves back quickly, giving the correct tension. Spring tension holds the motor, takes up slack, cushions loadshock that might otherwise damage motor and bearings. In changing belts it is necessary only to release the spring tension and place the new belt around the sheaves or pulleys.

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DUSTPROOF LIGHT FIXTURE

For use in coal-cleaning plants and similar locations a new dustproof lighting fixture with heavy threaded clear glass globe is offered by the Goodrich Electric Co., Chicago. With one-piece copper hood, the fixture may be fitted with heat-resisting daylight blue, ruby or diffusing globes instead of the clear globe which is standard. The unit is approved by the Underwriters' Laboratories for use in Class II, Group G, hazardous locations where combustible dust is, or is likely to be, suspended in the air in sufficient quantities to produce explosive mixtures. According to the manufacturer, the fixture is dustproof, moisture-proof and weatherproof, and is equipped with a resilient socket to prolong lamp life. It is offered in sizes to accommodate 25- to 150-watt lamps.

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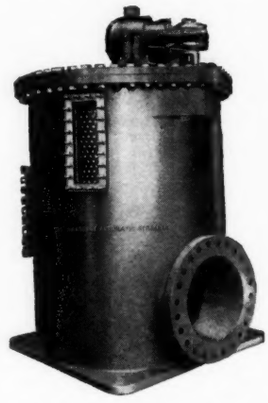
STRAINER CLEANS WATER

An automatic strainer which when substituted for a main dewatering cone makes possible the reuse in coal-washing systems of all water passed by the strainer is offered by H. A. Brassert &



Co., Chicago. Solids from the strainer backwash are eliminated by a small dewatering screen, the water returning to the system and the coal going to product.

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WELDER REMOTE CONTROL

Sterling Products Co., Los Angeles, Calif., offers the G-R remote control system whereby welding current may be regulated without interrupting work or even breaking the arc. The new system operates through a compact switch mounted on the welding tongs. A low-voltage relay circuit operated by the tong switch controls a reversible motor which in turn operates the full-range "stepless" Sterling G-R heat control. Six of the seven Sterling models of transformer-type welders are available with the new system; sizes range from the 20-125-amp. unit to the heavy-duty industrial models with maximum output of 1,250 amp. The latter are de-

signed for either single- or multi-circuit manual operation or as a current source for automatic welding heads.

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SAFETY SHIELD

A new contribution to offset hazards to eyes and face is a device known as the Dependon safety shield, offered by the Sellstrom Mfg. Co., Chicago. In effect, it might be likened to a small bay window through which the operator has an unobstructed view. The window material is synthetic, made to withstand heat, sparks and acids, and is so removed from the face as to allow perfect ventilation and the wearing of prescription glasses or goggles. Available in either clear or tinted effect, this material is made in various depths from forehead to chin.

A comfortable headband, adjusted to fit any cranium, has the window attached to it by special friction swivel joints that enable the wearer to raise the window entirely out of the way above his head and without interfering with spectacles or goggles.